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Biographical Sketch of Dr. Charles Mohr

BY EUGENE A. SMITH

Born 28 Dec. 1824, in Esslingem, Württemberg, the early years of Charles Mohr were spent there and at the Cloister Denkendorf where his father owned a manufactory of chemicals. His taste for natural history was first aroused by the reading of the famous Bridgewater Treatises, especially that of Buckland, and association with an uncle who was a pensioned forester of the district, kindled in him early that enthusiasm for botany and forestry which was to play so important a rôle in his after life. At the age of eighteen he entered the polytechnic school at Stuttgart, where he remained about four years, improving the opportunity for the study of exotic plants afforded by the royal gardens, and making valuable acquaintances among scientific men. Here he met with Aug. Kappler, the well-known collector of natural history specimens from South America, and in due course of time Mohr was invited to go on an expedition to the head waters of the Surinam in Dutch Guiana as collector, especially of plants. At Paramaribo, and on the Surinam and Maroni rivers, these collections were prosecuted, not without much suffering from fever and other troubles due to exposure, which, in the case of young Mohr, compelled him, after a seven months' stay in Guiana, to give up the work and to return to Europe, where he arrived early in 1847.

The revolution of 1848 which caused the derangement and breaking up of so many of the business affairs in Germany, led to the emigration to America of Charles Mohr and his elder brother.

After short stays in New York and Philadelphia, they made their home in Cincinnati. In 1849 in company with about fifty young men of that city, he set forth to seek his fortune in California. At Fort Laramie all superfluous baggage was left behind, and at Fort Hall on the upper waters of Lewis Fork of Snake River, the wagons were abandoned and their contents transferred to pack mules, and as the number of mules was limited, many of the party had to make the rest of the journey on foot.

Young Mohr thus lost all his books and a herbarium already well filled. The travellers arrived finally at a settlement in the Sacramento Valley, 110 days after leaving the last settlement on the border of Missouri. A year spent in gold mining with the unavoidable exposure to extremes of climate so told upon the health of young Mohr, as to compel him to give up his interests in the claim and return east, which he did by way of Panama. Stopping there for the purpose of regaining his strength, he had the misfortune to lose by theft all his belongings including his herbarium and a collection of minerals, and to fall a victim to fever, on partial recovery from which he took passage for New Orleans and arrived in Cincinnati towards the end of December, 1850.

The next two years were spent upon a farm in Indiana which he and his brother had purchased jointly, and it was during this time, 1852, that he was married. The rheumatic troubles contracted in California finally making the life of a farmer impossible to him, he went to Louisville where he became interested in the drug business, for which he had always a strong inclination. His long-interrupted botanical studies were renewed mainly through the acquaintance here made with Leo Lesquereux, at that time engaged in the study of the mosses. But the climate of Louisville did not agree with him and an attack of neuralgia which affected the heart and kept him confined to his bed for a long time, led him to seek a more genial one first in Louisiana and then in Vera Cruz, and finally in the highlands of Mexico between Cordova and Orizaba.

During his sojourn in Mexico he met with many congenial friends both among Germans and Mexicans, and he would probably have cast his lot with them but for the political agitations of 1857. Returning to the United States he established himself in the

drug business in Mobile, Ala., which continued to be his home till his removal to Asheville, N. C., about two years before his death.

During the Civil War his business suffered greatly, but he was employed by the Confederate government in the manufacture of drugs from native resources, and in testing the medicinal preparations smuggled into the country from Europe. After the close of the war he set to work with vigor to build up his business which soon became profitable. With returning prosperity his enthusiasm for botany revived, and he devoted all his leisure time, first to the investigation of the mosses of his district, instigated thereto by his friend Lesquereux, to whose work on "The Mosses of North America" he contributed no mean share. In these studies the ferns were also included, and his notes and observations thereon were given to Eaton for his "Ferns of North America."

Observations and collections in the other provinces of botany and forestry were by no means neglected, and frequent excursions into the swamps and fields accessible to him gave him that wide and accurate acquaintance with the whole flora of his section that made him easily first of the botanists of the South and the peer of any in the land.

His active mind was not content with botanical studies only, for we find him undertaking, in the interest of the "Grangers," all kinds of laborious investigations of the fertilizing values of native products such as the ashes of pine straw, of the various woods, of cotton seed hulls, etc., and in delivering lectures and writing articles on subjects connected with the improvement of the exhausted soils of the state, and the betterment of agricultural practice.

He also made excursions into the mineral sections of the state, especially into the gold region, enlarging at the same time his collections and observations on plant distribution and forestry.

From about 1878 the results of these investigations began to be made public in a series of articles, at first practical and economic only, afterwards more strictly scientific and specialized, but always directed toward the imparting of useful knowledge to his fellowmen. As with his collections, primarily intended to illustrate some feature of our natural resources, they grew in breadth and completeness until they became illustrative of monographs.

Among the first of these publications were "The Forests of Alabama and their Products"; and "The Grasses and other Forage Plants of Alabama," both written for Berney's Hand Book of Alabama, 1878, but afterwards amplified and published by the Department of Agriculture. In 1878, at the solicitation of the writer of these lines, he undertook the preparation for the Geological Survey of a normal herbarium of Alabama plants, based upon the collections made by himself and the writer. In 1880 we published a "Preliminary List of the Plants growing without Cultivation in Alabama," in which were enumerated the flowering plants and ferns up to that time collected and in the herbarium, numbering about 1,500 species. The expansion and elaboration of this modest "List" has just been published as "Plant Life of Alabama." In similar manner and chiefly through his efforts, the normal herbarium of Alabama plants above mentioned, has grown to be one of the most valuable of the collections of the Geological Survey in the Museum of the University of Alabama. In his honor it is now known as the *Charles Mohr Herbarium.*

His full and accurate knowledge of the natural resources of the Southern States, and his taste and skill in arranging and installing collections of various kinds, were often brought into requisition by the railroads, especially the Louisville and Nashville, and by the Department of Agriculture at Washington, and he made a number of illustrative collections of the varied resources of the territories traversed by these lines for the expositions of New Orleans, Louisville, and Atlanta, and prepared pamphlets descriptive of the same, such as "The Economic Geology of Alabama," "The Natural Resources of Alabama," "The Soils, Climate, and Agricultural Resources of the Territory traversed by the L. and N. R. R. Lines."

These pamphlets were characterized by a scientific spirit and truth to nature, and of them it has been remarked by Professor Lamson-Scribner, that they can "in no way mislead the reader or prospective settler." For the Tenth Census he prepared a Report on the Forestry Conditions of the Gulf States, and while engaged in this work he collected for the Alabama Geological Survey, and for the Arboretum at Harvard and for the Jesup Collection at the American Museum of Natural History, the sections of the trunks of the forest trees which adorn the halls of these institutions.

In 1882 he was invited by the Chief of the Agricultural Department at Washington to superintend the arrangement of the Agricultural and Forestry collections which had been brought together by the great railroad lines of the South and exhibited at the Atlanta Exposition in 1881. This brought him into contact with many scientific men with whom he contracted lasting friendships and from that time till his death he was engaged in investigations for the departments, especially of forestry, then in charge of his friend Fernow. He was enabled to give his entire time to scientific work after 1892, when he turned over to his sons the management of his business in Mobile. The amount of travel by rail, by private conveyance and on foot, which he accomplished in pushing these investigations was enormous, and to be appreciated only by those who enjoyed his personal acquaintance, for he counted no trouble too great, no hardship too severe, when there was something to be determined by his personal inspection, and at the age of seventy-two we find him riding all day on mule back up Cheaha Mountain to establish beyond doubt that the yellow pine grew at altitudes above 1,000 feet. He rarely took account of the fact that his health was not robust, and often overtaxed his powers, paying the penalty by being confined to his room for days.

During his later years he was employed upon "Plant Life of Alabama," and upon monographs for the Forestry Division. That on the timber pines was published in 1896, and those on the cypress, the juniper and the red cedar are now in press; the hard-wood trees were to follow next, the first of the series being that on the oaks, which he had completed just before his death. For our Geological Survey he had planned a second volume (Plant Life of Alabama being the first) on the Economic Botany of Alabama, which was to have been a complete account of the useful and noxious plants of the state. Unfortunately for us all he left of this volume only the general outline and plan.

In March, 1900, he removed to Asheville, N. C., where he spent the two remaining years of his life, enjoying to the utmost his botanical work, and the meetings with the botanists of the country who visited that beautiful spot. The Biltmore herbarium and the society of the botanists there attracted him most strongly, and frequent visits to the forests of the Biltmore estate

gave him opportunity for making observations and collecting valuable notes on the hard-wood trees of that section. His last illness came on suddenly after a day spent in the herbarium where he was greatly interested in the new species of *Crataegus*, there being worked out by Mr. Beadle, and in the accessions constantly coming in from the collectors in the different parts of the country, especially the South. He died at Ashville 17 July, 1901.

Personally, Dr. Mohr was one of the gentlest and most lovable of men, totally devoid of affectation and pretense, making fast friends with old and young wherever he went, and inspiring in them love and respect for the fullness and accuracy of his knowledge and for the nobility of his character.

The amount and quality of the botanical work accomplished by him fills us with admiration when we consider that it was done in hours that otherwise would have been hours of rest and recreation. His unselfish devotion to science is coming to be appreciated and the name of Charles Mohr will long be held in loving remembrance by all who recognize and honor true merit.

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The American Species of Limnorchis and Piperia, north of Mexico

By Per Axel Rydberg

In revising the manuscript of the Orchidaceae for Dr. Britton's Manual of the Flora of the Northern States and at the same time that of my Catalogue of the Flora of Montana and the Yellowstone Park,* I came to the conclusion that the genus *Habenaria* as treated in America was an altogether too diversified genus and contained species of very distant relationship. In Europe, as a rule, several genera are admitted. Prof. E. Pfitzer, who prepared the Orchidaceae for Engler and Prantl's Die natürlichen Pflanzenfamilien, places the North American *Habenariae* in the following genera: *Coeloglossum*, *Gymnadenia*, *Platanthera*, *Perularia* and *Habenaria*. Kraenzlin in his *Orchidacearum Genera et Species*, admits *Habenaria*, *Gymnadenia* and *Platanthera*. Both these authors place *Habenaria* in a separate subtribe from the rest. The true *Habenariae* are represented in North America by only a few species in the Gulf States, West Indies, Mexico and Central America. They are characterized by the long filiform appendages of the stigmas, anthers and petals. *Platanthera* as understood by Pfitzer is still a very complex genus and had he known the American forms as well as those represented in Europe, he undoubtedly would have restored Rafinesque's *Blephariglottis* for our fringed orchids and established a few more genera. During last July I stayed a few days in London and met Mr. Rolfe, the authority on orchids at Kew. He expressed the opinion that *Habenaria* must be split up, not only so that *Gymnadenia* and *Platanthera* should be taken out, but that all three genera should be subdivided. In one instance he went farther than I had dared, viz., expressing the opinion that *Orchis rotundifolia* perhaps should be removed from *Orchis*.

When doing my work referred to above, I came to the conclusion, that if *Coeloglossum* and *Perularia* should be admitted, certain other groups represented wholly by American species must be

* Mem. N. Y. Bot. Garden, Vol. I.

taken out of *Platanthera* and *Gymnadenia*. I therefore described in my Catalogue of the Flora of Montana the new genera *Lysiella* and *Limnorchis* and in Dr. Britton's Manual *Gymnadeniopsis*.* In the latter I also reëstablished *Blephariglottis* Raf. In the Bulletin of the Torrey Botanical Club,† I added another genus, *Piperia*. Of these, no species belonging to *Gymnadeniopsis*, *Blephariglottis* or *Piperia* are mentioned by Pfitzer, which shows that he was not well acquainted with these plants.

This revision is based on the material found at the New York Botanical Garden together with a few specimens cited from the Canby Herbarium. A few of the *Habenariae*, described from Mexico and Central America may belong to *Limnorchis* or *Piperia*. I have not seen, however, any species from there referable to either genus, but as several are unknown to me I have limited my work to the North American species growing north of Mexico. One of the Siberian specimens in the Columbia University herbarium is evidently a *Limnorchis*, but as it is wrongly named and rather scrappy, I have left it without consideration.

The illustrations are drawn by the writer and represent two views of each species on a scale twice the natural size.

LIMNORCHIS Rydb. Mem. N. Y. Bot. Gard. **1**: 104. 1900

Leafy-stemmed plants with elongated fusiform root-like tubers and fleshy-fibrous roots: flowers whitish or greenish or tinged with purple; upper sepal ovate to almost orbicular, erect, 3–7-nerved but usually 5-nerved; lateral sepals from linear to ovate-lanceolate, free from the lip, 3-nerved, seldom 4–5-nerved, spreading or often somewhat reflexed; upper petals erect, usually slightly shorter than the upper sepal, from narrowly to broadly lanceolate, 3-nerved, oblique at the base and semi-cordate, that is cordate on the lower side; lip entire, usually indistinctly nerved, flat or slightly concave, reflexed, free, not clawed, from linear to rhombic-lanceolate, obtuse; column short and thick; anther-cells parallel, opening in front; stigma broadly triangular; ovary sessile, in fruit elongated ellipsoid.

The mode of propagation in many orchids is very peculiar. Near the base of the stem is produced a short offset, tuber-, corm- or root-like in appearance, usually fleshy. In the upper portion

* Wrongly printed as *Gymnandeniopsis*.

† 28: 269. 1901.

is a hidden bud, from which the stem of the following year will spring, the lower portion is often root-like, elongated, sometimes cleft and functions more or less as a root. What this offset should be called I do not know. It has been called both tuber and corm. The latter name is not applicable from the way in which it arises. This would indicate the name tuber, for it is really formed at the end of a short subterranean branch, but it has only one bud and this is directed towards the place from which the offset sprang. The distal end, which in common tubers usually bears most of the buds, is here often root-like. This is especially the case in *Limnorchis*, and here the offsets are usually taken for roots. It may be that the larger portion thereof really is a fleshy primary root (if the term primary root can be applied to an offset). The secondary roots are developed the next year at its top from the base of the bud.

The first species of *Limnorchis* was described as *Orchis hyperborea* Linn.* The description was drawn from a specimen from Iceland collected by König. About the same time a plant also collected by König (and probably the same as the type of *O. hyperborea*) was figured in Flora Danica without a binominal name. The description accompanying this is a little faulty because it does not agree with the plate nor with any plant known. This description was copied by Retzius † and he gave it the name *Orchis Koenigii*. *Orchis hyperborea* L. is fairly common on Iceland and Greenland but rare on the American continent. Another plant closely related to it but larger and with shorter and more clavate spur has been confounded with it. In preparing the revision of Dr. Britton's manual I had not distinguished the two and the description of the spur refers principally to the larger plant. At my visit to the Botanical Garden at Copenhagen last summer, I first saw good material from Greenland and Iceland, and then I noticed the difference between the two plants. The larger plant has been named *Platanthera hyperborea β major* Lange ‡ and *Platanthera Koenigii* Lindl ; § but it is evidently not *Orchis Koenigii* Retz.

* Linn. Mant. 121. 1767.
† Fl. Scand. 1: 168. 1779.
‡ Consp. Fl. Groenl. 118. 1880.
§ Gen. et Sp. Orchid. Pl. 286. 1835.

In *Habenaria hyperborea* R. Br. or *Platanthera hyperborea* Lindl. there have been included several other forms, as for instance *Orchis Huronensis* Nutt.* (*Platanthera Huronensis* Lindl. *l. c.* 288), *O. dolichorhiza* Fisch.† and *Habenaria borealis* β *viridiflora* Cham.‡ All three, I think, are good species and they were so regarded by Lindley. The first is common in the northeastern America. In Britton's manual it appeared under the name *Limnorchis Huronensis* (Nutt.) Rydberg.§ I also described another species of the same group as *L. media*. That there were at least three distinct forms of the *L. hyperborea* group in the northeastern United States, I have not been the only one to notice, for Professor Peck ‖ recognized three growing in the same meadow. I did not see his report before the page proofs of the manual had already gone to the printer, but had come to the same conclusion independently. As the *L. hyperborea* of my treatment there contains in my opinion now two species, as I have stated before, the number of the group in the northeastern United States becomes four, and, together with three species of the *L. dilatata* group, our eastern species become seven.

Habenaria borealis β *viridiflora* Cham. is common throughout the Rocky Mountain region, the Columbia valley and the northern part of the Pacific coast. It is without doubt closer related to the true *L. hypoborea* than any of the other species and differs mainly in the light green flowers and the short clavate spur.

Orchis dolichorhiza (*Platanthera Koenigii* β *dolichorhiza* Lindl. *l. c.* 287), I have not seen, but from the description it must be distinct from either. This was from the island of Unalaska.

The second in order of the North American species of *Limnorchis* described was published under the name *Orchis dilatata* Pursh¶ (*Limnorchis dilatata* Rydb.**). It is a common plant of the northeastern part of this country. Most of the specimens so named from the Rockies and the west coast belong to *Habenaria borealis* Cham.††

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* Gen. N. Am. Pl. **2**: 189. 1818.

† Lind. l. c. 287, as a synonym.

‡ Linnaea **3**: 28. 1828.

§ Britt. Man. Fl. Northern States and Can. 294. 1901.

‖ See Peck, Regent's Rep. **50**: 126. 1897.

¶ Fl. Am. Sept. 588. 1814.

** Britton, Man. Fl. N. St. 294. 1901.

†† Linnaea **3**: 28. 1828.

(*Limnorchis dilatatiformis* Rydb.*). This differs from *L. dilatata* mainly in the shorter, more clavate spur, the dull or greenish white flowers and the usually smaller size. It approaches much the form referred to above under *L. hyperborea* viz. *Habenaria borealis* β *viridiflora* Cham., and in fact connects the *L. hyperborea* and the *L. dilatata* groups. The other specimens from the West labeled *Habenaria dilatata* belong to *L. leucostachys* and a few of the new species described below. No specimen of *L. dilatata* has been seen from any place west of Minnesota.

Lindley in his Genera and Species of Orchideous Plants described the following species which fall within the limits of *Limnorchis: Platanthera convallariaefolia, P. leucostachys, P. gracilis, P. stricta* and *P. graminea*. While staying at Kew in July this year, I had the privilege of seeing Lindley's herbarium as well as Douglas' plant preserved at Kew, which has enabled me to verify my determinations.

P. convallariaefolia was described from specimens collected in Kamtchatka by Fischer. It is a species resembling a slender *L. dilatata*, but the lip is linear, not at all dilated at the base, the spur is filiform and about the length of the lip and the lower leaves are oblanceolate and obtuse. In the Torrey herbarium there is a specimen communicated by Lindley. This is evidently a cotype of that in Lindley's own collection for the two are as like as they can be. In Torrey's herbarium there is also another specimen, collected on Unalaska, which I also refer here.

P. leucostachys was described from a specimen collected by Douglas. This is in the herbarium of the Kew Gardens. In this specimen the spur is slender, filiform, not at all thickened and not very obtuse at the apex. There is a form also common in the Columbia valley with the same habit but with the larger spur much more clavate and very obtuse at the apex. If this should be regarded as a form of *L. leucostachys* or as a distinct species is a question of which opinions may differ, but it is, however, important to know what the original *P. leucostachys* was.

P. gracilis is a slender plant with the white flowers of *L. dilatata*, but the lip is linear and the spur decidedly clavate. In reality it is nearest related to *P. convallariaefolia*, from which it dif-

* Mem. N. Y. Bot. Gar. 1 : 105. 1900.

fers mainly in the spur. It is not at all the plant that has gone under the name *Habenaria gracilis* in the United States. This is the following species, belonging to another group of the genus. *P. gracilis* is confined to Alaska and subarctic America.

P. stricta is the tall species, with greenish or purplish flowers, linear lip and short saccate spur, that Watson and others have called *Habenaria gracilis*. This is common in the Columbia region and the valleys of the Rockies as far south as Colorado.

P. graminea resembles *P. gracilis* in habit, but the leaves are narrower and the lip dilated at the base, the spur is longer and more clavate. Its home is Alaska. It was first collected by Menzies, and later by Miss Cooley and by Gorman. A single specimen from the lower St. Lawrence region evidently is to be referred here also.

Hooker's Flora Boreali-Americana contains the same species as Lindley's Genera.

Watson, in the Botany of California, has in his second section of *Habenaria*, which section would correspond to *Limnorchis*, the following species: *H. leucostachys* (Lindl.) S. Wats., *H. sparsiflora* S. Wats., *H. pedicellata* S. Wats., *H. hyperborea* R. Br., *H. Coperi* S. Wats., and *H. gracilis* S. Wats.

In *H. leucostachys*, he includes *H. Thurberi* A. Gray,* but the flowers of this species are greener, the dilated portion of the lip oval instead of rhombic and the spur longer. Watson states the characters of Gray's *H. Thurberi* were mostly drawn from the variety mentioned (*i. e.*, the same as *H. sparsiflora*), a statement which is not correct.

H. sparsiflora Wats. is a good species, which, together with *H. brevifolia* Greene† and two more species, constitute a distinct group, perhaps a subgenus, distinguished by the very broad and thin connective.

H. pedicellata Wats. *l. c.* I have not seen, but from the description it cannot belong to *Limnorchis*.

H. hyperborea of the Botany of California is the same as *H. borealis* β *viridiflora* Cham. and not *O. hyperborea* L.

* Proc. Am. Acad. 7: 389. 1868.
† Proc. Am. Acad. 12: 276 1876.
‡ Bot Gaz. 7: 218. 1881.

H. Cooperi Wats. *l. c.* is not a *Limnorchis*, but a *Piperia*.

H. gracilis Wats. is not the same as *Platanthera gracilis* Lindley, but *P. stricta* of the same author.

Kraenzlin's treatment in his *Orchidacearum Genera et Species* is altogether unsatisfactory. He admits only two species, *Platanthera gracilis* and *P. hyperborea*, the latter with several varieties.

His *P. gracilis* is, however, not *P. gracilis* Lindley but *Habenaria gracilis* Wats. (*P. stricta* Lindl.).

Under *P. hyperborea* α var. *genuina* he cites naturally also *Habenaria borealis* β *viridiflora* Cham. as a synonym, but he has printed *viridis* instead of *viridiflora*. I take this, however, as a distinct species.

P. convallariaefolia he has reduced to a variety, *P. hyperborea* β var. *convallariaefolia*. In the same manner, he calls *H. dilatata*, γ var. *dilatata* Lindl. (I do not think that Lindley ever made it a variety; Kraenzlin is very loose in citing authorities.) Under this variety he has as synonyms among others: *Platanthera Huronensis* Lindl., *Habenaria pedicellata* S. Wats., *H. Cooperi* S. Wats., *P. graminea* and *P. borealis* Reichenb. Of these the last named is the only one, that can be referred here with any reason, for that, which is the same as *Habenaria borealis* Cham., belongs to the *dilatata* group, while *P. Huronensis* belongs to the *hyperborea* group and *H. pedicellata* and *H. Cooperi* belong to distinct genera.

Under his δ var. *leucostachys* he has as synonyms besides *P. leucostachys* Lindl., also *Habenaria brevifolia* Greene, *P. Ghiesbrechtiana* Rich. & Gal., *P. sparsiflora* S. Wats., *P. Thurberi v. Grayi* S. Wats. and *H. flagellaris* S. Wats. Of these *Habenaria brevifolia* Greene and *H. sparsiflora* S. Wats. can under no conditions be referred to *H. leucostachys* on account of their broad connective. The habit of *H. brevifolia* alone should throw it out; there is scarcely a more distinct species in the whole family. As far as *H. sparsiflora* S. Wats. is concerned, it would have been more reasonable to refer that species to his *H. gracilis*, *i. e.*, *H. stricta* Lindl.; the habit and lip in the two are the same and the flowers have some resemblance. The main difference is in the spur and the connective. It is also to be noticed that Watson never published any *Platanthera sparsiflora* but a *Habenaria sparsiflora*, nor any var. *Grayi* of either *Platanthera* or *Habenaria Thurberi*. In the citation of the

place of publication of *P. Ghiesbrechtiana* Rich. et Gal., he has Ann. Sc. Nat. (1845) I. 30, when it should have been III. **3**: 30. *Habenaria flagellaris* S. Wats. has never been published.

A work with such numerous and glaring mistakes reflects little credit to the author, and how can it be trusted? He has given the following remarks under his *Platanthera hyperborea:* "Es is ein gänzlisch fruchtloses Bemühen, die unzähligen Formen dieser weitverbeiteten Art unter Diagnosen von besonderen Species zu fixieren. Je tiefer man in die Formenreihe eindringt, desto mehr verschwimmen die bei der Betrachtung einzelner für constant gehaltenen Merkmale. Durch die Liberalität amerikanischer Institute und Botaniker verfügen die europäischen Sammlungen über ein reiches Material, welches die kritische Beurteilung sehr wohl ermöglicht. Alle bisher beschriebenen 'Arten' stellen ihre Berechtigung auf rein habituelle Merkmale, was bei Orchideen stricte zu verwerfen ist."

It is evident that notwithstanding the statement given above the author has not tried very hard to bring the different forms under distinct diagnoses and he has not penetrated very deep into the series of forms when he did not find the broad thin connective of *Habenaria sparsiflora* and *H. breviflora;* perhaps he had seen neither. It is strange if the herbaria of continental Europe should be rich in North American orchids when our own are far from rich and the representation at Kew is very meager. And still if the author had examined the American material when at Kew, he would have been able to correct some of his mistakes. None of the species so far as I know have been merely based on characters in habit, for in all, the spur, the lip, and the stamen have been described more or less completely, and these are the only organs that give any reliable characters. The habit is mostly the same in all and can be used as a diagnostic character only in a few cases.

In discussing *H. brevifolia* Greene, the author remarks: "Der Samler und Autor der Pflanze vergleicht sie mit *Platanthera* oder nach seiner Schreibart *Habenaria sparsiflora* Wats. Der Vergleich is nicht glücklisch, denn *Pl. sparsiflora* ist eine noch dazu wenig charakteristische Form von *hyperborea*." Prof. Greene's comparison of *H. brevifolia* with *H. sparsiflora* was the only logical one, for the latter was the only known species with the flower-structure of *H. brevifolia*, although this has much larger flowers.

Synopsis of Species

Lip more or less lanceolate, *i. e.*, somewhat dilated near the base.
Flowers greenish or purplish.
Spur not twice as long as the lip. (HYPERBOREAE.)
Spur decidedly clavate, thickened and obtuse at the apex, shorter than the lip.
Petals purplish; spur only one half to two thirds the length of the lip, very saccate.
Lip linear or nearly so, 5–7 mm. long; ovary slightly curved; spike usually elongated. 1. *L. stricta.*
Lip lanceolate, fleshy, 4–5 mm. long; ovary strongly curved; spike usually short. 2. *L. purpurascens.*
Petals greenish; spur almost equalling the lip.
Petals ovate, three fourths as long as the upper sepal; spur very saccate. 3. *L. brachypetala.*
Petals lanceolate, only slightly shorter than the upper sepal; spur less saccate.
Lips less than 5 mm. long, lanceolate. 4. *L. viridiflora.*
Lip over 5 mm. long, ovate-lanceolate. 5. *L. major.*
Spur slender, scarcely thickened at all towards the apex, often acutish, equalling or slightly exceeding the lip.
Plant tall and stout; flowers comparatively large; sepals 4–6 mm. long. 6. *L. media.*
Plant slender; flowers small; sepals 2.5–4 mm. long.
Flowers almost erect in a rather lax spike. 7. *L. Huronensis.*
Flowers lateral in a dense spike. 8. *L. hyperborea.*
Spur about twice as long as the lip. (BEHRINGIANAE.) 9. *L. Behringiana.*
Flowers white or nearly so.
Spur about equalling or only slightly exceeding the lip. (DILATATAE.)
Spur usually shorter than the lip and clavate. 10. *L. borealis.*
Spur equalling or slightly exceeding the lip, slightly or not at all clavate.
Plant over 3 dm. high.
Bracts all longer than the flowers, the lower three times as long; lips about 1 cm. long, the dilated part oval. 11. *L. foliosa.*
Upper bracts shorter than the flowers, the lower at most twice as long; lips 5–7 mm. long, decidedly rhombic at the base.
Petals broadly lanceolate; flowers inodorous or nearly so. 12. *L. dilatata.*
Petals narrowly linear-lanceolate; flower very fragrant. 13. *L. fragrans.*
Plant less than 3 dm. high; petals narrowly linear-lanceolate. 14. *L. leptoceratitis.*
Spur from ¼ to ⅔ longer than the lip. (LEUCOSTACHYAE.)
Spur filiform, mostly acutish.
Plant 3 dm. or less high; spur 7–8 mm. long; lip 5–6 mm. 14. *L. leptoceratitis.*

Plant 5–8 dm. high; spur 10–14 mm. long; lip 7–9 mm.
Dilated portion of the lip oval; spur almost ⅔ longer than the lip. 15. *L. Thurberi.*
Dilated portion of the lip decidedly rhombic; spur scarcely ½ longer than the lip. 16. *L. leucostachys.*
Spur clavate at the apex.
Leaves lanceolate or oblanceolate; stem tall and stout; lip decidedly rhombic at the base. 16. *L. leucostachys robusta.*
Leaves narrowly linear; stem slender; lip not rhombic at the base. 17. *L. graminifolia.*
Lip linear, *i. e.*, not at all dilated at the base.
Spur usually shorter than the lip.
Flowers purplish or greenish; spur very short and decidedly saccate. 1. *L. stricta.*
Flowers white; spur almost equalling the lip. (CONVALLARIAEFOLIAE.)
Spur clavate. 18. *L. gracilis.*
Spur filiform. 19. *L. convallariaefolia.*
Spur much exceeding the lip; flowers greenish or purplish.
Connective narrow; spur almost twice as long as the lip. (ARIZONICAE.) 20. *L. Arizonica.*
Connective broad.
Leaves elongated, lanceolate or linear; spur 8–10 mm. long. (SPARSIFLORAE.)
Spike comparatively dense. 21. *L. ensifolia.*
Spike very lax.
Lip about 6 mm. long; spur about 8 mm., somewhat clavate. 22. *L. laxiflora.*
Lip about 8 mm. long; spur over 10 mm., filiform. 23. *L. sparsiflora.*
Leaves very short, ovate; spur almost 1.5 cm. long. (BREVIFOLIAE.) 24. *L. brevifolia.*

§HYPERBOREAE: Usually small or middle sized species, spike usually dense, except in the first species; flowers small, greenish or tinged with purple, especially the petals; spur less than twice as long as the lip; lip except in *L. stricta* lanceolate, *i. e.*, somewhat dilated at the base but not at all rhombic; connective narrow and anther-sacs close together.

1. LIMNORCHIS STRICTA (Lindl.) Rydb. Mem. N. Y. Bot. Garden **1**: 105. 1900

Platanthera stricta Lindl. Gen. & Sp. Orchid. Pl. 288. 1835–9; *Habenaria gracilis* Wats. Proc. Am. Acad. **11**: 277. 1876; *Habenaria hyperborea* Rothrock, Wheeler's Rep. **4**: 265. 1878; *Habenaria saccata* Greene, Erythea, **3**: 49. 1895; *Habenaria stricta* Ryd. Bull. Torr. Club, **24**: 189. 1897; *Platanthera gracilis* Kraenzlin, Orch. Gen. et Spec. **1**: 639. 1899. Not Lindl.

Tall and strict 3–10 dm. high: tubers fusiform, .5–1 cm. in diameter: lower leaves oblanceolate, obtuse, 5–12 cm. long, 15–25 mm. wide: the upper lanceolate, acute: spike usually very long, 1–3 dm., and lax: bracts linear-lanceolate, the lower much longer than the flowers, often 3–4 cm. long: flowers 12–14 mm. long: sepals green, rather thin; the upper ovate, erect, 4–5 mm. long; the lateral ones lanceolate, obtuse, 5–6 mm. long: petals purplish, lanceolate, acute; lip linear, obtuse, 5–7 mm. long, thick, purple; spur one-half to two-thirds as long as the lip, purplish, very saccate, *i. e.*, thickened and round at the apex. (Fig. 1.)

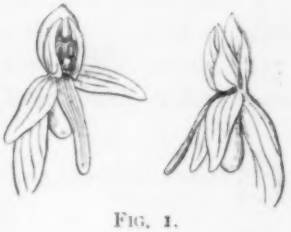

FIG. 1.

The structure of the flowers places this species in the *L. hyperborea* group, although the lip is linear, scarcely at all broadened at the base. This character and the lax spike would place it near *L. laxiflora*, but that is distinguished by the long spur and broad connective. *L. stricta* is common in damp places, swamps, etc., from Alaska to Washington, Wyoming and Montana. It has also been collected in Colorado at Twin Lakes, 1873, *John Wolf, 965*, and Manitou, 1896, *Fred. Clements.*

TYPE: "*America boreali-occidentalis, Douglas.*"

2. LIMNORCHIS PURPURASCENS Rydb. Bull. Torr. Club, **28**: 269. 1901

A rather stout plant, 3–5 dm. high: tubers elongated, fusiform: leaves ovate to lanceolate, acute, 6–10 cm. long, 15–30 cm. wide, dark green: spike dense; bracts lanceolate, the lower exceeding the flowers: these 10–12 mm. long: lateral sepals oblong, linear to lanceolate, obtuse, 4–5 mm. long; the upper broadly ovate, erect, obtuse, tinged with purple: petals slightly shorter, erect, purple, lanceolate; lip broadly linear-lanceolate, obtuse, about 5 mm. long, purplish, thick, slightly dilated at the base; spur one-half to two-thirds as long as the lip, slightly curved and strongly saccate: ovary strongly curved. (Fig. 2.)

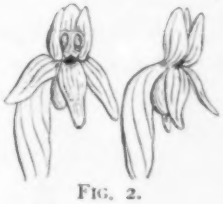

FIG. 2.

This species resembles the preceding in the short spur and purplish flowers, but the habit and form of the lip are more like that of *L. hyperborea*. *L. purpurascens* is a rare plant, growing on

damp wooded hillsides at an altitude of 2700–3000 m. The following specimens belong here:

COLORADO: Iron Mountain, 1900, *Rydberg & Vreeland, 6414* (type in herb. N. Y. Bot. Gard.); Georgetown, 1878, *M. E. Jones, 314;* Como, South Park, 1895, *C. S. Crandall;* Mouth of Cheyenne Cañon, 1896, *E. A. Bessey.*

3. LIMNORCHIS BRACHYPETALA Rydb. Bull. N. Y. Bot. Garden **2**: 161. 1901.

Stem slender, striate, 4–5-leaved, 1–2 dm. long: tubers elongated fusiform, 7–8 mm. thick: lower leaves oblong, obtuse, 4–6 cm. long, strongly nerved; the upper lanceolate, acute: spike short, 5 cm. long; bracts linear-lanceolate, the lower 2–3 times as long as the flowers: flowers greenish or brownish, 8 mm. long: upper sepals about 2 mm. long, nearly orbicular, slightly truncate and indistinctly 3-toothed at the apex; lateral sepals spreading, oblong, obtuse, nearly 3 mm. long: petals round ovate, acute, slightly over 1 mm. long; lip very narrow, a little dilated at the base and near the apex, acute: spur clavate, almost saccate, nearly straight, about equalling the lip in length. (Fig. 3.)

FIG. 3.

In habit and flower most like *L. hyperborea*, but with a narrower lip, shorter petals and shorter and thicker spur, which resembles those of the two preceding but is comparatively longer. *L. brachypetala* grows in wet places in Alaska and the Yukon Territory.

YUKON TERRITORY: Bennett City, 1899, *R. S. Williams* (type in herb. N. Y. Bot. Gard.); above Fort Selkirk, 1899, *J. B. Tarleton, 116.*

ALASKA: Unalaska, 1891, *J. M. Macoun, 142.*

4. **Limnorchis viridiflora** (Cham.)

Habenaria borealis β viridiflora Cham. Linnaea, **3**: 28. 1828; *Habenaria hyperborea* S. Wats. Bot. Cal. **2**: 134. 1880; in part and subsequent authors; *Limnorchis hyperborea* Rydb. Mem. N. Y. Bot. Garden, **1**: 104. 1900.

Stem 2–5 dm. high: tubers elongate fusiform, 5–7 mm. thick: lower leaves 5–15 cm. long, 2–3 cm. wide, oblanceolate, obtuse; the upper lanceolate, acute: spike short and dense; bracts linear-lanceolate, the lower slightly exceeding the flowers: flowers 10–12 mm. long, light green: upper sepal broadly ovate, erect, 3–4 mm. long; lateral ones 5–6 mm. long, lanceolate, acutish or obtuse, spreading; petals erect, lanceolate, acute, slightly shorter than the upper sepal; lip lanceolate, obtuse, less than 5 mm. long; spur decidedly clavate, curved, about equalling the lip. (Fig. 4.)

FIG. 4.

This species is closely related to the true *L. hyperborea*, and is its representative in the west. It differs only in the lighter green flower and the thicker and shorter spur. It is also related to *L. borealis* on the other hand, and it is no wonder that Chamisso made it a variety of that species, as it differs only in the green flowers and more saccate spur. Intermediate forms are met with; these are perhaps of hybrid origin. *L. viridiflora* is common in the Rocky Mountain regions and the Cascades. Its range extends from southern Alaska to North Dakota, central Nebraska and Colorado, and is the common plant of the West, known as *Habenaria hyperborea*. Numerous specimens have been examined.

TYPE: "Unalaschca," Chamisso.

5. **Limnorchis major** (Lange)

Platanthera Koenigii Lindley, Gen. & Sp. Orchid. Pl. 286. 1835. Not *Orchis Koenigii* Retz. 1779; *Platanthera dilatata* Torr. Fl. N. Y. **2**: 276, in part. 1843; *Habenaria hyperborea* Gray, Man. Ed. 5: 500, in part. 1867; *Platanthera hyperborea* β *major* Lange, Consp. Fl. Groenl. 118. 1880; *Limnorchis hyperborea* Rydb.; Britton, Man. Fl. N. St. 294. 1901, in part.

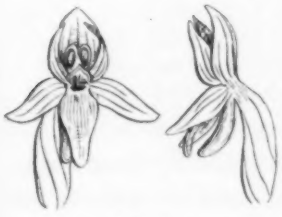

FIG. 5.

Stem stout, 2–6 dm. high: leaves lanceolate, mostly acute, 5–30 cm. long, 1.5–4 cm. wide: spike dense, 5–15 cm. long; bracts lanceolate, the lower slightly exceeding the flowers: flowers 12–14 mm. long: upper sepal broadly ovate, obtuse, 5 mm. long; the

lateral ones ovate-lanceolate, obtuse, spreading: petals lanceolate, acute, oblique, a little shorter than the sepals; lip 5–6 mm. long, ovate-lanceolate, obtuse; spur almost equalling or somewhat exceeding the lip, distinctly clavate and curved. (Fig. 5.)

This is the most common species in Greenland, but also found on the North American continent. It differs from *L. hyperborea* in the stouter habit, the larger flowers, the broader lip and the clavate spur. It is more common than the specimens cited below seem to indicate, but I have cited here only the specimens in our herbaria, as these are the only ones presently at hand.

GREENLAND: Godhaven, 1878, *L. Kumlein;* and a specimen by an unknown collector from Hooker's herbarium.

MAINE: Norway, *S. O. Smith.*

WISCONSIN: Milwaukee, *I. A. Lapham.*

NEW YORK: North Yonkers, 1887, *J. F. Poggenburg; Torrey; A. Gray.*

6. LIMNORCHIS MEDIA Rydb.; Britton, Man. N. St. 294. 1901

Habenaria dilatata Torr. Comp. 318, in part. 1826. Not *Orchis dilatata* Pursh. 1813; *Habenaria hyperborea* Gray, Man. Ed. 5: 500, in part. 1867, and subsequent authors.

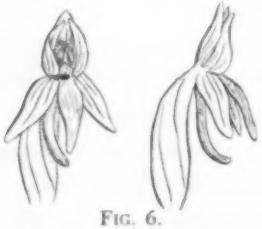

FIG. 6.

Stem very stout, 4–8 dm. high: tubers narrowly fusiform, 5–7 mm. thick: leaves lanceolate, acute, 1–2 dm. long: spike long, densely flowered; bracts large, longer than the flowers, with scabrous margins: flowers divaricate, about 15 mm. long: upper sepal ovate, obtuse, about 5 mm. long; lateral ones lanceolate or oblong, 5–6 mm. long: petals green or purplish, lanceolate, acute; lips lanceolate, obtuse, about 6 mm. long; spur filiform, *i. e.*, not at all clavate, curved, slightly longer than the lip. (Fig. 6.)

This is nearest related to the preceding, but still stouter, and differs in the narrower lip and more slender, not clavate spur. In habit it is intermediate between *L. major* and *L. dilatata*, and has been confused with both. The name refers to this fact and not to the size, for it is the largest species of the *hyperborea* group.

CANADA: Quebec, *Mrs. Percival.* (Type in Torrey Herbarium.); Notre Dame chez Lac, 1887, *John Northrop.*

VERMONT: Willoughby, 1892, *H. H. Rusby.*

NEW YORK: *John Torrey;* Silver Bay, Lake George, 1901, *J. F. Kemp.*

WISCONSIN: Milwaukee, 1881, *Dr. Hasse.*

MINNESOTA: Minnehaha Creek, 1890, *E. A. Mearns, 77.*

SOUTH DAKOTA: Harney Peak, 1892, *Rydberg, 1028* (in part).

7. LIMNORCHIS HURONENSIS (Nutt.) Rydb.; Britton, Man. Fl. N. St. 294. 1901

Orchis Huronensis Nutt. Gen. N. Am. Pl. **2**: 189. 1818; *Platanthera dilatata* Beck. Bot. 347, in part. 1833. Not *Orchis dilatata* Pursh. 1814; *Platanthera Huronensis* Lindl. Gen. et Sp. Orchid. Pl. 288. 1835; *Habenaria hyperborea* Gray, Man. Ed. 5: 500, in part; *Platanthera hyperborea* γ var. *dilatata* Kraenzlin, Orch. Gen. & Sp. 640. 1899, in part.

Stem slender, 2–4 dm. high: lower leaves oblanceolate, obtuse; the upper lanceolate, acute, 5–10 cm. long, 1.5–2 cm. wide: spike long, lax; bracts lanceolate, the lower often twice as long as the flowers: flowers light green, almost erect: upper sepal ovate, 2–3 mm. long; lateral ones 2–4 mm. long, oblong to lanceolate, obtuse: petals narrowly lanceolate, slightly shorter than the sepals, oblique; lip linear-lanceolate, 3–4 mm. long; spur filiform, not clavate, strongly curved and slightly longer than the lip. (Fig. 7.)

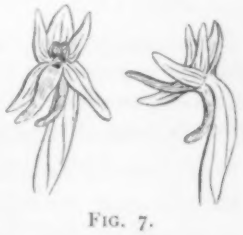

FIG. 7.

This species is nearest related to *L. hyperborea,* and distinguished by the erect flowers, the narrower lip and the longer pod. It is also usually taller with a laxer spike.

TYPE: "In wet places on the islands of Lake Huron and Michigan."

CANADA: Quebec, *Mrs. Percival.*

VERMONT: Monkton, 1879, *C. G. Pringle.*

MASSACHUSETTS: Shelbourne, 1889, *Geo. F. Taylor.*

CONNECTICUT: Canaan, 1866, *W. H. Leggett.*

NEW YORK: Utica, 1833, *Dr. Gray;* Albany, *L. C. Beck;* Jamesville, 1890, *L. M. Underwood;* Silver Bay, Lake George, 1901, *J. F. Kemp;* Catskills, 1887, *G. Rampsberger.*

MICHIGAN: Long Lake, 1890, *Beardsley & Kofoid.*
MINNESOTA: Chisago Lake, 1892, *B. C. Taylor.*
WISCONSIN: Madison, *S. H. Watson.*

8. LIMNORCHIS HYPERBOREA (L.) Rydb.; Britton, Man. Fl. N. St. 294, in part. 1901

Orchis hyperborea L. Mant. 121. 1767; *Habenaria hyperborea* R. Br. Hort. Kew. Ed. 2: **5**: 193. 1813; *Platanthera hyperborea* Lindl. Gen. & Sp. Orchid. Pl. 287. 1835.

FIG. 8.

Low and slender, 1.5–4 dm. high: tubers almost fleshy-fibrous, slightly thicker than the roots: lower leaves oblanceolate, obtuse, 5–10 cm. long, 1–2 cm. broad; the upper lanceolate, acute: spike rather dense; bracts linear-lanceolate, the lower slightly longer than the flowers: flowers light green, 8–12 mm. long: upper sepal broadly ovate, obtuse, 3–4 mm. long; lateral ones lanceolate: petals lanceolate, slightly shorter than the sepals; lip lanceolate, obtuse, nearly 5 mm. long; spur filiform, strongly curved and a little exceeding the lip. (Fig. 8.)

In habit *L. viridiflora* and this species are much alike and the former would have been merged in the latter, if all the western specimens (*i. e.*, *L. viridiflora*) seen, had not had more or less clavate spur, a character not seen in Icelandic, Greenlandic and eastern specimens.

TYPE: "Islandia, *König.*"
ICELAND: Gardas, 1888, *Prof. & Mrs. Sprague Smith.*
CANADA: Big Swamp, 1866, *J. Macoun.*
NEW BRUNSWICK: Kennebeccosis, 1871, *J. Fowler.*
VERMONT: Willoughby, 1892, *H. H. Rusby.*
NEW YORK: Kirkville, Onondaga county, 1891, *L. M. Underwood, 3155.*

§ BEHRINGIANAE: Low plants, 1–1.5 dm. high: spike short and dense: flowers greenish-purple; lip oblong-lanceolate; spur fully twice as long as the lip; connective narrow.

9. **Limnorchis Behringiana** sp. nov.

Stem low, 1–1.5 dm. high, about 3-leaved: tubers elongated fusiform, about 5 mm. thick: lower leaf ovate-lanceolate, about 5 cm. long and 1.5–2 cm. wide; the upper lanceolate and smaller: spike dense, 3–4 cm. long; bracts linear-lanceolate, the lower about

twice as long as the flowers : flowers purplish, about 12 mm. long : upper sepal ovate, obtuse, 4–5 mm. long ; the lateral ones oblong : petals equalling the sepals, broadly lanceolate ; lip about 5 mm. long ; spur fully 10 mm. long, filiform. (Fig. 9.)

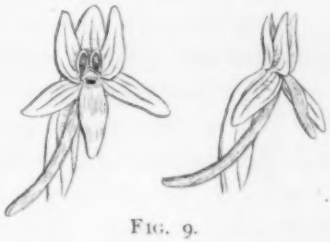

FIG. 9.

This species is not closely related to any of the other species. The type specimens were labelled *Habenaria gracilis* Wats. With this, *i. e.*, *L. stricta* it has scarcely anything common except the color of the flowers and such characters as are found in all species of *Limnorchis*. *L. Behringiana* has not been found in North America but I include it in here, as it would likely be found in Alaska, as *L. convallariaefolia* from the same region has been.

ASIA : Behring Island, 1891, *British Behring Sea Commission, 143* (type in herb. Columbia Univ.).

§ DILATATAE : Plants usually middle sized : flowers white or in the first species yellowish-white ; lip lanceolate, more or less distinctly rhombic dilated near the base ; spur equalling or slightly longer than the tip ; connective narrow.

10. **Limnorchis borealis** (Cham.)

Habenaria borealis Cham. Linnaea, **3** : 28. 1828 ; *Platanthera dilatata* Lindl. Gen. and Sp. Orchid. Pl. 287 ; in part. 1835 ; *Habenaria dilatata* Coult. Man. Rocky Mts. 342. 1885 ; *Habenaria dilatatiformis* Rydb. Bull. Torr. Club, **24** : 189. 1897 ; *Platanthera hyperborea* γ var. *dilatata* Kraenzlin, Orch. Gen. et Sp. 640. 1899, in part ; *Limnorchis dilatatiformis* Rydb. Mem. N. Y. Bot. Garden, **1** : 105. 1900.

FIG. 10.

Tall and leafy, 4–8 dm. high : tubers elongated fusiform, 5–8 mm. thick : lowest leaves oblanceolate and obtuse ; the rest lanceolate, acute, 5–15 cm. long, 1.5–2.5 cm. wide : spike often rather dense, 1–2 dm. long ; bracts lanceolate, the lower often much exceeding the flowers : flowers 10–14 mm. long, white or sometimes yellowish or greenish white : upper sepal ovate, obtuse, 4–5 mm. long ; the lateral ones oblong-

lanceolate, spreading: petals lanceolate, slightly shorter than the sepals; lips rhombic-lanceolate, obtuse, about 5 mm. long; spur usually shorter than the lip, and more or less clavate. (Fig. 10.)

This species represents *L. dilatata* in the Rocky Mountain region, but differs in the smaller flowers and shorter, more clavate spur. It also approaches *L. viridiflora*, from which it differs in the whiter flowers and more rhomboid lip. Where growing together, intermediate forms are often found, perhaps of hybrid origin. *L. borealis* is common from Alaska to Washington and Colorado.

TYPE: "Unalaschca," Chamisso.

11. **Limnorchis foliosa** sp. nov.

Stem stout and very leafy, about 3 dm. high: leaves linear-lanceolate, attenuate, 1–1.5 dm. long: spike short and dense, less than 1 dm. long; bracts linear-lanceolate, attenuate, about three times as long as the flowers: these about 15 mm. long, white: upper sepal broadly linear, obtuse, about 6 mm. long; lateral ones narrowly lanceolate, about 9 mm.: petals narrowly linear-lanceolate, attenuate; lip about 10 mm. with an oval base and an almost linear lower half, obtuse: spur about the length of the lip, filiform, not at all clavate. (Fig. 11.)

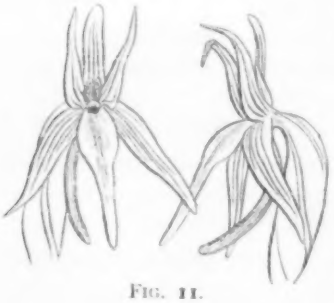

FIG. 11.

This species has the habit of *Perularia flava* and *Coeloglossum bracteatum*, but the flower is of the typical *Limnorchis* type and places it nearest to *L. dilatata*. The flowers, however, are larger and the lip less rhomboid.

ALASKA: Nagai, 1871–2, *M. W. Harrington* (Dall's Exploration; type in the Columbia herb.).

12. LIMNORCHIS DILATATA (Pursh) Rydb.; Britton, Man. Fl. N. States, 294. 1901

Orchis dilatata Pursh, Fl. Am. Sept. 588. 1814; *Habenaria dilatata* Hook. Exot. Fl. *pl. 95*. 1825; *Platanthera dilatata* Lindl.; Beck. Bot. N. & M. St. 347, in part. 1833; *Platanthera hyper-*

borea ; var. *dilatata* Kraenzlin, Orch. Gen. et Sp. 640, in part. 1899.

Stem slender, tall, leafy, 3–6 dm. high : leaves lanceolate, 7–20 cm. long, the lower obtuse, the upper acute : spike 5–25 cm. long, usually rather lax ; bracts linear-lanceolate, the lower twice as long as the flowers : flowers white, 15–18 mm. long : upper sepal ovate, obtuse, about 6 mm. long, the lateral ones lanceolate, acutish : petals acute, lanceolate ; lip lanceolate with a rhomboid base, about 7 mm. long ; spur longer than the lip, filiform, scarcely at all clavate. (Fig. 12.)

FIG. 12.

L. dilatata is common from Newfoundland to Saskatchewan, south to New York and Nebraska.

TYPE : "In Labrador. *Colmaster, v. s. in Herb. Dickson.*"

Limnorchis dilatata linearifolia var. nov.

Stem slender ; leaves linear, attenuate, 5–10 cm. long, 5–7 mm. wide.

Very different from the species in general habit, but the flowers are exactly the same, and intermediate forms are not lacking.

NEW YORK : Bridgewater, *Dr. Gray* (type in herb. Torrey).

MICHIGAN : Portage of Kee-wana-wa, *Dr. Peters.*

13. LIMNORCHIS FRAGRANS Rydb.; Britton, Man. Fl. N. States, 294. 1901

Stem slender, 2–3 dm. high : tubers narrowly fusiform, about 5 mm. thick : leaves linear, about 1 dm. long and 8–10 mm. wide, acute : spike slender, lax ; bracts lanceolate, acuminate ; the lower longer than the flowers : flowers pure white, very fragrant : upper sepal ovate-lanceolate, obtuse ; the lateral ones linear-lanceolate, acutish, strongly veined : petals narrowly linear-lanceolate, equalling the sepals ; lip lanceolate with an ovate-rhomboid base, about 5 mm. long ; spur filiform, not at all clavate, curved, slightly exceeding lip. (Fig. 13.)

FIG. 13.

Closely resembling the variety of preceding species, it is distinguished by the narrow petals and sepals and by the fragrance.

The two sheets of the orginal collection in the Columbia Herbarium are the only ones seen.

VERMONT: Willoughby Mountain, 1892, *H. H. Rusby* (type in herb. Columbia Univ.).

14. LIMNORCHIS LEPTOCERATITIS Rydb. Bull. N. Y. Bot. Garden, **2**: 162. 1901

Stem slender, 2–4 dm. high: tubers slender, slightly thicker than the fleshy fibrous roots: lower leaves oblong, obtuse, 4–8 cm. long, 1–1.5 cm. wide, the upper linear-lanceolate, acute: spike short, less than 1 dm. long; bracts linear-lanceolate, the lower somewnat longer than the white flowers: sepals 3–4 mm. long, lanceolate: petals linear or narrowly linear-lanceolate, about equalling the sepals; lip lanceolate, somewhat rhombic, dilated at the base; spur very slender, filiform, strongly curved forward, a little exceeding the lip. (Fig. 14.)

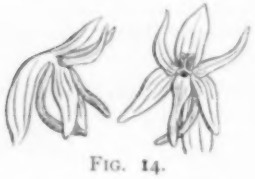

FIG. 14.

This is nearest related to the eastern *L. dilatata* and *L. fragrans*, but differs in the smaller size, smaller flowers and shorter leaves. In habit it resembles most a depauperate *L. borealis*, but the spur is different.

YUKON TERRITORY: Bennett City, 1899, *R. S. Williams* (type in herb. N. Y. Bot. Gard.).

ALASKA: Unalaska, 1891, *J. M. Macoun;* southern Alaska, 1883, *J. Albert Rudkin.*

BRITISH COLUMBIA: Tulameen River, 1900, *J. F. Kemp.*

§ LEUCOSTACHYAE: Tall and stout plants: flowers pure white or slightly greenish in *L. Thurberi;* lip lanceolate with a more or less rhombic or oval dilatation near the base; spur more than ¼ longer than the tip; connective narrow: spike long and dense.

15. **Limnorchis Thurberi** (A. Gray) Rydb.

Habenaria Thurberi A. Gray, Proc. Am. Acad. **7**: 389. 1868; *Habenaria leucostachys* S. Wats. Bot. Cal. **2**: 134, in part. 1880; Coville, Cont. U. S. Nat. Herb. **4**: 201. 1893; *Platanthera hyperborea* β var. *leucostachys* Kraenzlin, Orch. Gen. et Sp. 640, in part. 1899.

Stem stout and leafy, 4–6 dm. high: tubers elongated fusiform, 6–7 mm. in diameter: leaves lanceolate to linear-lanceolate, 1–2 dm. long, 1.5–3 cm. wide, acute: spike long and dense; bracts linear-lanceolate, attenuate, about equalling the flowers: these dull white, 16–20 mm. long: upper sepal ovate, obtusish; the lateral ones lanceolate, acute: petals lanceolate, about equalling the sepals; lip 7–8 mm. long, lanceolate, obtuse, the dilated portion ovate; spur filiform, curved, about ⅔ longer than the lip.

FIG. 15.

This has been merged into *L. leucostachys*, which it resembles in habit, but the spike is denser, the flowers are dull or greenish white, and the form of the lip is different.

TYPE: "Arizona, Thurber (925)."

NEW MEXICO: 1851–52, *C. Wright, 1900.*

CALIFORNIA: *Thomas Bridges, 356;* Mammoth, 1891, *Coville & Funston, 1822;* Miner's Ditch, Nevada county, 1867, *N. J. Davis, 37;* Canoe Creek, *J. S. Newberry;* Nevada, 1893, *Michener & Bioletti;* Sisson, 1897, *H. E. Brown, 320;* Marin county, 1873, *Edwards;* Bernardino Mts., 1882, *S. B. & W. F. Parish, 1521;* Fresno county, 1900, *Hall & Chandler, 150.*

16. LIMNORCHIS LEUCOSTACHYS (Lindl.) Rydb. Mem. N. Y. Bot. Garden, **1**: 106. 1900.

Platanthera leucostachys Lindl. Gen. & Sp. Orchid. Pl. 288; *Habenaria leucostachys* S. Wats. Bot. Cal. **2**: 134. 1880; *Platanthera hyperborea* δ var. *leucostachys* Kraenzlin, Orch. Gen. et Sp. 640, in part. 1899.

Stem stout and tall, 6–10 dm. high: lower leaves oblanceolate, 1–2 dm. long, 1.5–3 cm. wide; the upper lanceolate, acute: spike 1–3 dm. long, rarely very dense; bracts linear-lanceolate, the lower exceeding the flower: these purely white, 15–20 mm. long: upper sepal ovate, obtuse, about 5 mm. long; lateral ones lanceolate, acute, 7–8 mm. long: petals lanceolate, attenuate, a little shorter than the upper sepal; lip lanceolate with a decidedly rhombic base, about 8 mm. long; spur filiform, scarcely clavate,

acutish, about half longer than the lip, less than 1 mm. thick. Fig. 16.)

FIG. 16.

Lindley describes this as having the lip half as long as the spur, but I have not seen any with so long a spur, not even in Douglas' specimens at Kew.

TYPE: "In ora *occidentali Americae septentrionalis, Douglas (hab. s. sp. comm. Soc. Hort.).*"

ALASKA: Ankow River, 1892, *F. Funston, 52.*

WASHINGTON: Snoqualmie, 1892, *M. Parker;* Wallawalla to Kuskuski, 1838–42, *Wilkes Exp., 526.*

IDAHO: 1892, *Isabel Mulford;* Priest Lake, 1900, *D. T. MacDougal, 7 and 178.*

UTAH: 1871, *Palmer, 461.*

NEVADA: E. Humboldt Mountains, 1868, *S. Watson, 1154.*

CALIFORNIA: Sierra county, 1874, *Lemmon;* Plumas county, 1881, *Mrs. Austin;* Yosemite Valley, 1866, *Bolander, 4936.*

Limnorchis leucostachys robusta var. nov.

Very stout and tall, 4–10 dm. high, leafy: spike long and dense, 1–3 dm. long: spur usually clavate, over 1 mm. thick, obtuse, about one-third longer than the lip. (Fig. 17.)

This may be distinct from *L. leucostachys* but the only characters distinguishing it from the type is the thicker spur and the denser spike. More field work is needed in order to settle its relationship to *L. leucostachys.* The following specimens are in our herbaria:

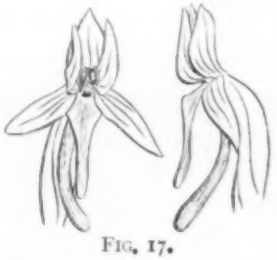

FIG. 17.

OREGON: 1871, *Elihu Hall, 505.*

WASHINGTON: 1889, *R. S. Vasey, 77* (type in herb. N. Y. Bot. Gard.); Chevalis River, 1897, *Frank H. Lamb, 1199a;* Olympia, 1898, *A. A. & E. G. Heller, 4046;* Falcon Valley, 1893, *W. H. Suksdorf, 1356;* Upper Valley of the Nesqually, 1894, *O. D. Allen;* Yakima Region, 1883, *F. Tweedy;* Palace Camp,

1883, *Mrs. Bailey Willis;* Seattle, 1890, *C. V. Piper;* Cascade Mts., 1882, *Brandegee, 480.*

BRITISH COLUMBIA: Vancouver Island, 1887, *John Macoun;* Tulameen River, 1900, *Prof. J. F. Kemp.*

IDAHO: Valley of Clearwater River, 1892, *Sandberg, MacDougal & Heller, 288.*

17. **Limnorchis graminifolia**

Platanthera graminea Lindley, Gen. & Sp. Orchid. Pl. 289. 1835; not *Habenaria graminea* Spreng. Syst. **3**: 690. 1826; nor *P. graminea* Lindley, *l. c.* 292; *Platanthera hyperborea γ* var. *dilatata* Kraenzlin, Orch. Gen. et Sp. 640, in part, 1890.

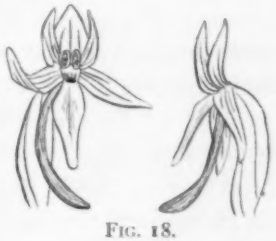

FIG. 18.

Very slender, 3–4 dm. high: leaves narrowly linear, 5–10 cm. long, 3–4 mm. wide: spike short; bracts lanceolate, shorter than the flowers: these white, 12–15 mm. long: upper sepal ovate, 4 mm. long, the lateral ones lanceolate: petals narrowly lanceolate, slightly shorter than the upper sepal; lip lanceolate, obtuse, dilated near the base, but not rhombic; spur one-third to one-half longer than the lip, clavate towards the apex, acute. (Fig. 18.)

This plant is nearest related to *L. leucostachys*, but differs in the slender habit, narrow leaves and the form of the lip. The type is in Lindley's herbarium, where I saw it. The specimens from Lower Canada I cannot distinguish from the Alaskan specimens, although the occurrence of the species on the east coast is exceedingly remarkable.

TYPE: "In ora *occidentali Americae septentrionalis, Menzies* (*hab. s. sp. comm. cel. Menzies*)."

ALASKA: Douglas Island, 1891, *Grace E. Cooley;* Gorman's Lake, 1895, *M. W. Gorman, 74.*

CANADA: Mouth of Riviere du Loup, *Wm. Canby.*

§ CONVALLARIAEFOLIAE: Slender plants about 3 dm. high: spike short and rather lax: flowers white; lip linear, not at all dilated at the base; spur about equalling the lip; connective narrow.

18. **Limnorchis gracilis** (Lindl.).

Platanthera gracilis Lindley, Gen. & Sp. Orchid. Pl. 288. 1835.

Slender, about 3 dm. high: leaves oblong to lanceolate, 5–10 cm. long, 1–1.5 cm. wide, the lower obtuse, the upper acute: spike slender and lax, about 1 dm. long; bracts lanceolate the lower slightly exceeding the flowers: these white, 10–12 mm. long: upper sepal broadly oval, about 4 mm. long, the lateral ones linear-lanceolate, acute: petals linear-lanceolate; lip linear, obtuse, 6–7 mm long; spur clavate, only slightly curved, a little shorter than the lip. (Fig. 19.)

FIG. 19.

This resembles *L. stricta* in the linear lip and the lax spike, but has white flowers and slender spur. Watson confused the two and following him, most authors have used the name *Habenaria gracilis* for *L. stricta*. No one who has seen Lindley's type could confuse the two.

TYPE: "In ora *occidentali Americae septentrionalis, Menzies;* Observatory inlet, *Herb. Hooker* (*hab. s. sp. comm. cel. Menzies*)."

. ALASKA: Back Bay, 1895, *M. W. Gorman, 52* (in Columbia Herbarium); *Sitka, 1891, W. G. Wright* (*1559*) (?).

SUBARCTIC AMERICA: 1861–2, *I. S. Onion.*

19. **Limnorchis convallariaefolia** (Lindl.)

Platanthera convallariaefolia Lindl. Gen. & Sp. Orchid. Pl. 287. 1835; *Platanthera hyperborea* β, var. *convallariaefolia* Kraenzlin, Orch. Gen. et Sp. 640. 1899.

Stem slender, about 3 dm. high: leaves oblong-lanceolate or oblanceolate, 4–8 cm. long, 1–2 cm. wide, the lower obtuse, the upper acute: spike short, less than 1 dm. long; bracts lanceolate or linear-lanceolate, equalling or the lower exceeding the whitish flowers: upper sepal almost orbicular or broadly ovate, 3–4 mm. long; lateral ones lanceolate, obtuse: petals lanceolate, acute; lip linear, about 6 mm. long, obtuse; spur filiform, curved, almost equalling the lip. (Fig. 20.)

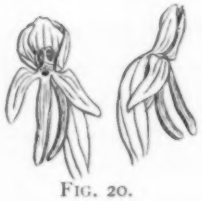

FIG. 20.

This is closely related to *L. gracilis*, and differs scarcely in any respect except that the flowers are smaller and the spur is longer and more slender. It was described from specimens collected by

Fischer in Kamtchatka. The type is in Lindley's herbarium and a cotype in Torrey's. The Unalaska specimen also collected by Fischer, I cannot distinguish from the Asiatic.

TYPE: "In *Kamtchatka, Fischer* (*hab. s. sp. comm. cel. Prescott*)."

ASIA: Kamtchatka, *Fischer, ex. herb. Lindley.*

ALASKA: Unalaschca, *Fischer.*

§ ARIZONICAE: Rather stout, 5–7 dm. high: spike long and lax: flowers light greenish; lip linear, not at all dilated at the base; spur filiform, almost twice as long as the lip; connective narrow.

20. **Limnorchis Arizonica** sp. nov.

Stem tall, leafy: lower leaves oblong, about 5 cm. long, obtuse, the middle and upper ones linear, the former 2–3 dm. long, 2–3 cm. wide: spike slender, lax, many-flowered 1.5–3 cm. long; bracts linear-lanceolate, the lower slightly longer than the flowers: these 12–15 mm. long, greenish or purplish: upper sepal broadly ovate, 3–4 mm. long; lateral ones ovate-lanceolate: petals lanceolate, acute, slightly shorter than the upper sepal, 4–5 mm. long. (Fig. 21.)

FIG. 21.

This species resembles somewhat both *L. stricta* and *L. sparsiflora.* From the former it is easily distinguished by the long slender spur and from the latter by the many-flowered spikes, smaller flowers and narrow connective. It grows in rich cañons of Arizona.

ARIZONA: 1891, *Nealley* (type in herb. N. Y. Bot. Gard.); Santa Rita Mts., 1881, *C. G. Pringle;* Ft. Huachuca, 1893, *T. E. Wilcox;* Weber Creek, 1887, *E. A. Mearns, 133.*

§ SPARSIFLORAE: Plant slender, light green: spike elongated: flowers greenish with strongly reflexed sepals; lip linear; spur slender, much longer than the lip; connective very broad: leaves normal.

21. **Limnorchis ensifolia** sp. nov.

Platanthera hyperborea δ var. *leucostachys* Kraenzlin, Orch. Gen. et Sp. 640, in part. 1899; not *P. leucostachys* Lindl.

Stem strict, 3–4 dm. high, light colored, few leaved: leaves linear-lanceolate, attenuate, slightly falcate, 1–1.5 dm. long, 1–1.5 cm. wide: spike short and not very lax; bracts lanceolate,

acuminate, light green, about equalling the flowers: these greenish, about 15 mm. long: upper sepal broadly ovate, about 5 mm. long; lateral sepals about 7 mm. long, oblong-lanceolate: petals narrowly lanceolate, acute; lip linear, about 8 mm. long, thick; spur filiform, about 1 cm. long. (Fig. 22.)

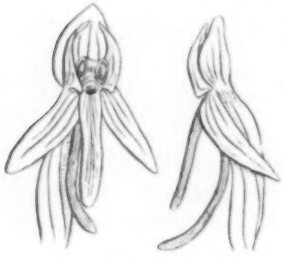

FIG. 22.

This is nearest related to *L. sparsiflora*, but the spike is shorter and denser, the upper sepals and petals larger and the bracts shorter and broader, and light colored. The type was growing at an altitude of about 2600 mm.

ARIZONA: Mt. Humphrey, 1897, *R. E. Kunze* (type in herb. N. Y. Bot. Gard.); Willow Springs, 1874, *Rothrock, 269*.

UTAH: "Central Utah," 1875, *C. C. Parry, 89*; Rock Creek, 1877, *Dr. E. Palmer, 460* (in part).

NEW MEXICO: Silver City, 1880, *E. L. Greene.**

22. **Limnorchis laxiflora** sp. nov.

Stem slender, 4–6 dm. high: lower leaves oblanceolate, obtuse, 8–10 cm. long, 1–1.5 cm. wide; the upper linear-lanceolate, acute: spike very slender and lax, 1–2 dm. long, few-flowered; bracts linear-lanceolate, usually equalling or shorter than the flowers: these greenish, 10–12 mm. long: upper sepals broadly obovate, obtuse, about 4 mm. long; lateral ones broadly lanceolate, acutish: petals almost equalling the upper sepal, lanceolate; lip linear, obtuse, about 6 mm. long; spur about 8 mm. long, slightly clavate, a little longer than the lip. (Fig. 23.)

FIG. 23.

This is closely related to and has been mistaken for *L. sparsiflora*, which, however, has larger flowers, longer spur, not at all clavate, longer bracts and more slender stem.

OREGON: Coast Mountains, 1884, *Thomas Howell* (type in herb. Columbia College); Interior of Oregon, 1838–42, *Wilkes Expedition*; 1871, *Elihu Hall, 504*.

UTAH: Rock Creek, 1877, *Dr. E. Palmer* (*460* in part).

* This is labelled *Habenaria flagellaris* Wats.

COLORADO: Uncompahgne Mountains near Los Pinos, 1878, *Wm. F. Flint.*

23. **Limnorchis sparsiflora** (S. Wats.) Rydb.

Habenaria sparsiflora S. Wats. Proc. Am. Acad. **12**: 276. 1877; *Platanthera hyperborea δ* var. *leucostachys* Kraenzlin, Orch. Gen. et Sp. 640, in part. 1899.

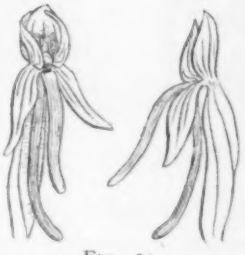

FIG. 24.

Stem tall and slender, 4–6 dm. high: lower leaves oblanceolate, obtuse, 1–2 dm. long, 1.5–3.5 cm. wide; the upper lanceolate, acute: spike long, slender and lax, 2–3 dm. long; bracts linear-lanceolate, usually exceeding the flowers: these light green, very delicate, about 15 mm. long: upper sepal broadly ovate, 4–5 mm. long; the lateral ones lanceolate, acute, about 6 mm. long: petals narrowly lanceolate, acute; lip linear, about 8 mm. long, obtuse; spur filiform, about 1 cm. long. (Fig. 24.)

This is characterized by the long, slender, lax spike, delicate green flowers and long bracts. The type was collected by Bolander, near Mariposa Grove, California.

OREGON: Kerbyville, 1884, *T. Howell.*

CALIFORNIA: Donner Lake, 1865, *J. Torrey, 511;* Pine Ridge, Fresno county, 1900, *Hall & Chandler, 139;* Truckee River, 1893, *C. F. Sonne;* Mt. Dyer, 1879, *R. M. Austin;* Sierra county, 1874, *Lemmon.*

NEW MEXICO: 1881, Mongollon Mountains, *H. H. Rusby.*

§ BREVIFOLIAE: Like the SPARSIFLORAE, but leaves very short· much reduced: flowers nearly twice as large.

24. **Limnorchis brevifolia** (Greene) Rydb.

Habenaria brevifolia Greene; Coulter, Bot. Gaz. **6**: 218. 1881; *Platanthera hyperborea δ* var. *leucostachys* Kraenzlin, Orch. Gen. et Sp. 640, in part. 1899.

Stem strict, leafy, 3–6 dm. high: leaf-blades ovate, 2–4 cm. long and about 1 cm. wide, acute: spike elongated, 1–2 dm. long; bracts similar to the leaves but smaller, about equalling the flowers: these green, 2–2.5 cm. long: upper sepal ovate, about 5 mm. long; lateral sepals linear, acute, about 8 mm. long: petals

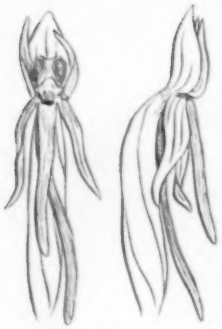

FIG. 25.

linear-lanceolate, acute, a little shorter than the upper sepal; lip linear, obtuse, about 10 mm. long; spur filiform, about 15 mm. long. (Fig. 25.)

This is characterized by its large flowers and reduced leaves.

TYPE: "On dry southward slopes of the Pinos Altos Mountains, New Mexico, in 1880."

NEW MEXICO: White Mountains, 1897, *E. O. Wooton, 544*; Pinas Altos Mountains, *E. L. Greene.*

MEXICO: State of Chihuahua, Sierre Madre, 1887, *C. G. Pringle, 1374.*

PIPERIA Rydb. Bull. Torr. Club, **28**: 269. 1901

Somewhat leafy-stemmed plants, but the leaves are usually near the base and withering at or before the anthesis, the stem-leaves being reduced and bract-like: tubers spherical or rounded ellipsoid; flowers greenish or white; sepals and petals 1-nerved or very obscurely 3-nerved; the upper sepal ovate or lanceolate, erect; the lateral ones spreading, linear to lanceolate, their bases united with the claw of the lip; upper petals free, lanceolate or linear-lanceolate, oblique, but not cordate; the blade of the lip linear-lanceolate to ovate, obtuse, truncate or hastate at the base, concave but with a longitudinal low ridge in the middle produced by the undulation of the lip; the claw, if it can be called so, united with the bases of the lower sepals, bordered with an erect margin which connects the lip with the column; anther cells unusually large for the size of the flower, parallel, opening nearly laterally: stigma a small beak in the angle between the anther-cells; ovary sessile, ellipsoid in fruit.

The principal differences between *Limnorchis* and *Piperia* are the following:

LIMNORCHIS	PIPERIA
Tubers elongated fusiform, root-like.	Tubers rounded.
Stem leafy; leaves remaining until fruit is set.	Stem leafy at the base; leaves withering at or before anthesis.

LIMNORCHIS	PIPERIA
Sepals 3–7-nerved; petals distinctly 3-nerved, without gibbosities.	Petals and sepals 1-nerved or obscurely 3-nerved, with small gibbosities at their bases.
Lateral sepals free.	Lateral sepals with their bases adnate to the claw of the lip.
Lip flat or concave, without median ridge, not truncate at the base, free.	Lip with a more or less distinct median ridge; blade truncate or hastate at the base; a margin connecting the claw with the column.
Anther-cells opening in front.	Anther-cells opening laterally.

The first species of *Piperia* was originally described as *Spiranthes Unalaschensis* Sprengel * and generally known as *Habenaria Unalaschensis* Wats. In the Kew Index this species is referred to *Herminium congestum*, a plant from northern India. We have no specimen of the latter, but the identity is so unlikely that I did not think of making a comparison when I visited Kew last summer. *P. Unalaschensis* is no *Herminium*, however, for that genus is distinguished by the total absence of a spur besides by different structures of the column. Kraenzlin recognizes both *Platanthera Unalaschensis* and *P. foetida*. It is true that no one seems to know exactly what *Spiranthes Unalaschensis* Sprengel really was, but I know of no plant except the present species, which agrees with Sprengel's short description.. Kraenzlin placed *P. Unalaschensis* among the scapose species and *P. foetida* among the foliose, but in the description he characterizes the latter as having the leaves near the base. I cannot find any character on which to base a segregation of two species. The publication of *Platanthera foetida* Geyer, is generally given as Hook. Journ. Bot. **7**: 376. 1855; but there is no description, only the name and references to the locality where it was collected. The first real publication seems to have been in King's Report, where Watson gives it as a synonym under *Habenaria foetida* there described. *Gymnadenia longispica* Durand † has been referred to this species, but this must be a mis-

* Syst. **3**: 708. 1826.

† Pl. Pratten, 101. 1855.

take as that species was described as having a spur longer than the ovary, which is not the case with *P. Unalaschensis*.

The second species of *Piperia* was first described as *Platanthera elegans* Lindl.* from specimens collected by Douglas in northwestern America. It seems from the description as if more than one species had been included therein as for instance "*caule squamis parvis ramentaceis, spica longa densa cylindracea.*" Although this species has scale-like stem leaves, they are not by far so conspicuous as in the species that Bolander took for *H. elegans* and that the spike is described as dense does not very well fit this species. Not having any authentic specimen I naturally thought that the name *Platanthera elegans* Lindley belonged to the species named *Habenaria elegans* by Bolander or else the one that I have described here as *Piperia multiflora*. I therefore described the lax-flowered species under the name *P. elongata*. At Kew last summer, I found only one specimen collected by Douglas and this I refer to my *P. elongata* although its spike is more dense than in my type, but not denser than some specimens of the same species in our herbaria. It is, therefore, best to pass my *P. elongata* into synonymy for the present.

With regard to *Habenaria elegans* Bolander it must be stated that it was not properly published before it appeared in the Botany of California, for in Bolander's Catalogue of the Flora of San Francisco it is a *nomen nudum*, without description or synonyms. What Bolander's plant was is not unknown, for there is one specimen in the Torrey herbarium collected and named by Bolander. This can scarcely be distinguished from *Habenaria Michaeli* Greene,† although it has a longer, less crowded spike.

A further study has revealed that several other species than the ones enumerated in the place of publication of *Piperia*, must be included in that genus, *viz.*, *Habenaria Michaeli* Greene, and *Gymnadenia longispica*, both mentioned above, *Habenaria Cooperi* Wats.‡ and *Habenaria maritima* Greene.§ Concerning *H. Cooperi* Wats. it may be remarked that it was placed by Watson in that

* Gen. & Spec. Orchid. Pl. 285. 1835.
† Man. Bay Reg. Bot. 306. 1894.
‡ Proc. Am. Acad. 12: 276. 1876.
§ Pittonia, 2: 298. 1892.

section of *Habenaria* which now constitutes *Limnorchis*, but his description of the flower is the best hitherto given of any species o *Piperia*.

Synopsis of Species

Spur less than twice as long as the lip.
- Stem leafy only at the base; lip oblong; spur slender, slightly exceeding the lip. 1. *P. Unalaschensis.*
- Stem more or less leafy; lip ovate.
  - Spur slightly exceeding the lip, very saccate. 2. *P. Cooperi.*
  - Spur nearly twice as long as the lip, only slightly clavate. 3. *P. lancifolia.*

Spur 2–3 times as long as the lip, filiform.
- Lip linear to lanceolate.
  - Spike very lax; lip 4–5 mm. long; spur about 8–10 mm. 4. *P. leptopetala.*
  - Spike dense; lip about 6 mm. long; spur 15–18 mm. long. 5. *P. multiflora.*
- Lip ovate or ovate-lanceolate.
  - Spike elongated, lax; leaves withering at anthesis.
    - Bracts linear-lanceolate; stem leafy only at the base. 6. *P. elegans.*
    - Bracts ovate-lanceolate; stem usually leafy. 7. *P. longispica.*
  - Spike short and very dense; flowers crowded; leaves withering before anthesis.
    - Petals and sepals about 4 mm. long; petals purplish or greenish. 8. *P. Michaeli.*
    - Petals and sepals about 5 mm. long; petals white. 9. *P. maritima.*

1. PIPERIA UNALASCHENSIS (Spreng.) Rydb. Bull. Torr. Club, **28**: 270. 1901

Spiranthes Unalaschensis Spreng. Syst. **3**: 708. 1826; *Habenaria Schischmareffiana* Cham. Linnaea, **3**: 29. 1828; *Herminium Unalaschkense* Reichenb. Fl. Germ. **13**: 107. *pl. 65*; *Platanthera Schischmareffiana* Lindl. Gen. & Sp. Orchid. 286. 1835; *Habenaria foetida* S. Wats. Bot. King's Exped. **5**: 341. 1871; *Platanthera foetida* Geyer. as a synonym under the preceding; *Habenaria Unalaschensis* Wats. Proc. Am. Acad. **12**: 277. 1877; *Montolivaea Unalaschensis* Rydb. Mem. N. Y. Bot. Gard. **1**: 107. 1900.

Stem strict, slender, 3–5 dm. high, leafy only near the base: basal leaves oblanceolate, obtuse or acutish, 1–1.5 dm. long, .8–3 cm. wide, withering at anthesis or soon after; stem leaves bract-like, linear-lanceolate to lanceolate, attenuate, .5–1 cm. long: spike long and lax, 1–3 dm. long; bracts lanceolate to ovate-lanceolate,

one-half to two-thirds as long as the flowers: these greenish, distinctly in spirals, 8–10 mm. long: petals and sepals 2–4 mm. long, upper sepal ovate, acutish; lateral ones oblong-lanceolate, obtusish: petals purplish green, somewhat fleshy, lanceolate, oblique at the base; lip oblong, obtuse, slightly hastately lobed near the base; spur filiform or slightly clavate, a little exceeding the lip but shorter than the ovary. (Fig. 26.)

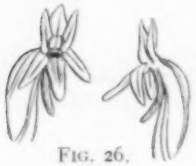

FIG. 26.

P. Unalaschensis is common from southern Alaska and Alberta to California and Colorado, and grows in damp woods.

TYPE: "*Ins. Aleut.*"

The following locality is remarkable, being far out of the supposed range:

QUEBEC: Jupiter River, Anticosti, 1883, *John Macoun.*

2. **Piperia Cooperi** (S. Wats.)

Habenaria Cooperi S. Wats. Proc. Am. Acad. **12**: 276. 1876.

Tall and strict, 3–10 dm. high, leafy below: basal leaves oblong lanceolate, acute, about 1 dm. long; lower stem leaves lanceolate, attenuate, 10–15 cm. long; the upper reduced and bract-like, lanceolate, 1–2 cm. long: spike strict and lax, 1–3 dm. long; bracts ovate-lanceolate, acuminate, two-thirds as long as the flowers: these yellowish-green, about 10 mm. long: sepals and petals about 4 mm. long, obtuse; upper sepal ovate; lateral sepals and petals oblong lanceolate; lip ovate, rounded at the apex, somewhat hastate at the truncate base, but the lobes rounded, rather thick and with prominent ridge in the middle; spur thick, decidedly clavate, about equalling the lip, but much shorter than the ovary. (Fig. 27.)

FIG. 27.

I have not seen the type, collected by Cooper at San Diego, California, but the plants cited below agree with the description and were collected in the same region. It is from these I have drawn the description and figure.

TYPE: "On Clay hills near San Diego, California; Dr. J. G. Cooper."

CALIFORNIA: San Diego, 1884, *C. R. Orcutt;* Point Loma, 1897, *T. S. Brandegee.*

3. **Piperia lancifolia** sp. nov.

Stem stout, 3–5 dm. high, the lower portion leafy; basal leaves and lower stem-leaves lanceolate, attenuate, 10–15 cm. long, 1–2 cm. wide, withering after anthesis: spike many-flowered, but lax, 2–3 dm. long; bracts ovate, acute, striate, about two-thirds as long as the flowers, or the lower almost equalling them: flowers greenish, 11–13 mm. long: upper sepal ovate, obtuse, about 4 mm. long; the lateral ones slightly longer, oblong-lanceolate: petals lanceolate, obtusish, oblique at the base; lip about 4 mm. long; blade round-ovate, rounded at the apex, truncate at the base, scarcely at all hastate, thick, with prominent median ridge; spur filiform, slightly clavate, almost twice as long as the lip and about equalling the ovary. (Fig. 28.)

FIG. 28.

This species is closely related to the preceding, differing in the longer less clavate spur, scarcely at all hastate lip and broader bracts. It is growing in cañons.

CALIFORNIA: Sierra Santa Monica, 1892, *H. E. Hasse, 5675* (type in herb. N. Y. Bot. Gard.).

4. **Piperia leptopetala** sp. nov.

Stem slender, 3–4 dm. high, leafy only at the base: basal leaves two, oblong-lanceolate, obtuse or acutish, about 1 dm. long, 1.5–2.5 cm. wide, withering at anthesis or soon after; stem leaves all reduced and bract-like, few, lanceolate, acute: spike slender, lax, 1–2 dm. high; bracts lanceolate to linear-lanceolate, acuminate, about half as long as the flowers: these greenish, about 1 cm. long: upper sepal lanceolate, obtuse, about 4 mm. long; lateral ones narrowly lanceolate, acute, about 5 mm. long: petals narrowly lanceolate, acute, about equalling the upper sepal; blade of the lip lanceolate, obtuse, hastately toothed at the base; median ridge rather obscure; spur filiform, not clavate, about twice as long as the lip and longer than the ovary. (Fig. 29.)

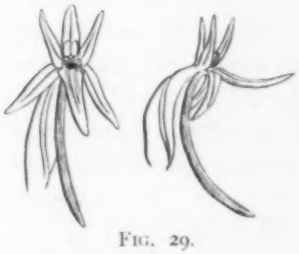

FIG. 29.

In habit this species resembles most *P. Unalaschensis*, but the sepals and petals are narrower and the spur is almost twice as long.

CALIFORNIA: Mountains east of San Diego, 1850, *C. C. Parry* (Mex. Bound. Surv., type in herb. Columbia Univ.); Plumas county, 1875, *Mrs. Austin.*

WASHINGTON: Nesqually River, 1838–42, *Wilkes Exp., 146,* in part.

5. **Piperia multiflora** sp. nov.

Montolivaea elegans Rydb. Mem. N. Y. Bot. Garden, **1**: 106, in part as to specimen cited. 1900; not Reichenb. 1881; *Piperia elegans* Rydb. Bull. Torr. Club, **28**: 270, in part. 1901.

FIG. 30.

Stem stout, 4–6 dm. high, 3–4-leaved only near the base: basal leaves oblong, oblanceolate or obtuse or acutish, 1–1.5 dm. long, 2–3 cm. wide, withering at anthesis; lower stem leaves lanceolate, acute; upper stem leaves much reduced and bract-like, lanceolate or linear-lanceolate, scattered, attenuate, 1–2 cm. long: spike very dense, 1–2 dm. long; bracts linear-lanceolate, almost equalling the flowers: these greenish-white, spreading, about 1.5 cm. long: upper sepal lanceolate, acute, 4–5 mm. long; lateral sepals and petals linear-lanceolate, acutish or obtuse; lip almost linear, obtuse, only slightly hastate at the base, about 6 mm. long; median ridge very low; spur 15–18 mm. long, filiform, not clavate. (Fig. 30.)

This species is perhaps nearest related to *P. elegans,* differing however in the dense spike, the spreading flowers, and narrow petals and sepals.

WASHINGTON: Gray's Harbour, 1838–42, *Wilkes Exped., 194* (type in herb. Columb. Univ.); Cascade Mountains, 1882, *Brandegee, 475.*

MONTANA: Mission Range, 1883, *W. M. Canby, 307.*

CALIFORNIA: Monterey, *Wm. Rich.*

6. PIPERIA ELEGANS (Lindl.) Rydb. Bull. Torr. Club, **26**: 270 in part. 1901

Platanthera elegans Lindl. Gen. & Sp. Orchid. Pl. 285. 1835; *Montolinaea elegans* Rydb. Mem. N. Y. Bot. Gard. **1**: 106, in

part, as to synonym. 1900; not Reichenb. 1881; *Piperia elongata* Rydb. Bull. Torr. Club, **28**: 270. 1901.

Stem slender, strict, 4–7 dm. high: tuber ellipsoid, about 2 cm. long, 1 cm. in diameter: basal leaves 2 or 3; blades lanceolate or oblanceolate or rarely oval, acute or obtuse, 8–15 cm. long, 1–3, sometimes even 5 cm. wide; stem-leaves much reduced, lanceolate, acuminate, 5–10 mm. long: spike long and usually lax, 1.5–3 dm. long; bracts lanceolate, acuminate, from half to fully as long as the flowers: these greenish-white, about 1 cm. long: sepals about 5 mm. long; the upper lanceolate, acute; the lateral ones linear-oblong or lanceolate, obtuse: petals lanceolate, acute; blade of the lip broadly or ovate-lanceolate, slightly hastate and truncate at the base; median ridge rather indistinct; spur filiform, 10–12 mm., about two and a half times as long as the lip and longer than the ovary. (Fig. 31.)

FIG. 31.

TYPE: "In *America boreali occidentali, Douglas (hab. s. sp. comm. Soc. Hort.).*"

BRITISH COLUMBIA: Vancouver Island, 1887, *John Macoun.*

WASHINGTON: W. Klickitat county, 1885, *W. N. Suksdorf.*

OREGON: Grave Creek Hills, 1887, *Thomas Howell;* 1871, *Elihu Hall, 506.*

IDAHO: Priest Lake near lower end, 1900, *D. T. MacDougal, 168;* Priest River valley, *134;* Kootenai county, 1887, *J. H. Sandberg;* Wiessner's Peak, 1892, *Sandberg, MacDougal & Heller, 584* (broad leaved).

CALIFORNIA: Santa Lucia Mountains, 1898, *R. A. Plaskett, 167;* 1872, *Mrs. Bancroft.*

7. **Piperia longispica** (Durand)

Gymnadenia longispica Durand, Pl. Pratten, 101. 1855.

Stem stout, 3–7 dm. high, more or less leafy below: tuber ellipsoid, 3–4 cm. long, about 1.5 cm. thick, basal leaves and lower stem leaves 2–4, lanceolate, acute, 1–1.5 dm. long, 2–3.5 cm. wide, withering about the time of anthesis: upper stem leaves reduced, 1–3 cm. long, lanceolate: spike many-flowered, but not dense, 1–3 dm. long; bracts ovate-lanceolate, .5–1 cm. long, acuminate: flowers greenish, about 1.5 cm. long: upper sepal ovate, obtuse,

about 5 mm. long ; lateral sepals oblong-lanceolate, obtuse : petals broadly lanceolate ; blade of the lip ovate-hastate, distinctly auricled, and truncate at the base ; spur filiform, two and a half times as long as the lip. (Fig. 32.)

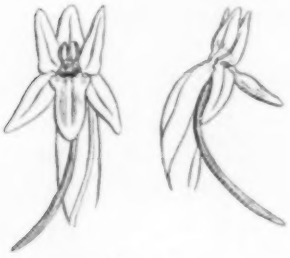

FIG. 32.

I have not seen the type of *Gymnadenia longispica*, which was described from a fragmentary specimen collected by Pratten, *i. e.*, it consisted only of the upper portion without any leaves. Durand's species has been regarded as *P. Unalaschensis* but this cannot be so, for *Gymnadenia longispica* was described as having a spur longer than the ovary, which throws it out of *P. Unalaschensis*. As the spike is described as long and lax it must have been either *P. elegans*, *P. leptopetala* or the species described here. As this is the only species with broad bracts, the name *G. longispica* must belong here, unless it is a species unknown to me. The only discrepancy is that the spur is described as clavate, which is scarcely the case.

CALIFORNIA : Mokelumne River, *Mr. Rich* ; Monterey, 1850, *C. C. Parry* (Mex. Bound. Surv.) ; Cucamonga Mts., 1881, *S. B. & W. F. Parish, 1157* ; Santa Monica range, 1892, *H. E. Hasse*.

8. **Piperia Michaeli** (Greene)

Habenaria elegans Boland. (Cat. Pl. San Franc. 29) ; S. Wats. Bot. Calif. **2** : 133. 1880 ; not *Platanthera elegans* Lindl. 1835 ; *Habenaria Michaeli* Greene, Man. Bay-Reg. Bot. 306. 1894 ; *Montoliveia elegans* Rydb. Mem. N. Y. Bot. Gard. **1** : 106, in part as to synonym, 1900 ; *Piperia elegans* Rydb. Bull. Torr. Club, **28** : 270, in part as to synonym.

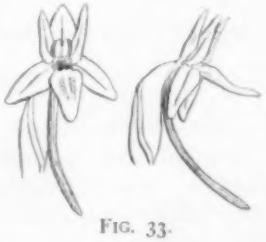

FIG. 33.

Stem stout, at flowering time leafless, 2–3 dm. high : tuber ellipsoid, 2–4 cm. long, 1–1.5 cm. wide : basal leaves elliptic or oblanceolate, about 1.5 dm. long, 4 cm. wide, withering before blooming ; stem-leaves numerous, small and bract-like, lanceolate to ovate-lanceolate, acuminate,

1–2 cm. long: spike very dense, 5–15 cm. long: flowers about 1 cm. long, greenish: upper sepal ovate, about 4 mm. long; lateral ones oblong-lanceolate, obtuse: petals lanceolate, acute; blade of the lip ovate, obtuse, scarcely hastate, obtuse or truncate at base; spur filiform, about two and a half times as long as the lip and a third longer than the ovary. (Fig. 33.)

TYPE: "Open hills, under oaks, etc., from near Livermore southward."

CALIFORNIA: San Luis county, 1886, *G. W. Michael;* Stansbury Valley, 1876, *Harry Edwards;* San Francisco, 1838–42, *Wilkes Expedition, 1554,* in part; "California," *Bolander.*

WASHINGTON: Gray's Harbor, 1838–42, *Wilkes Expedition, 1554,* in part; Nesqually River, *146,* in part.

9. **Piperia maritima** (Greene)

Habenaria maritima Greene, Pittonia, **2**: 298. 1892.

Stem stout, 2–3 dm. high, at flowering time leafless: tuber almost spherical, 2–2.5 cm. in diameter: leaf-blades oblong, obtuse or acute, about 1 dm. long, 3–4 cm. wide, withering before anthesis; stem leaves reduced and bract-like, numerous, ovate-lanceolate, acuminate, 1–2 cm. long: spike short and very dense, 4–10 cm. long; bracts about two-thirds as long as the flowers: these 10–12 mm. long, white: upper sepal ovate, obtuse, about 4 mm. long; lateral sepals oblong-lanceolate: petals broadly lanceolate; blade of the lip elliptic, obtusish, scarcely hastate, somewhat truncate at the base, as well as the petals and sepals, white, thin; spur filiform, about 2.5 times as long as the lip and longer than the ovary. (Fig. 34.)

FIG. 34.

This differs from all the other species in its stoutness and white flowers. It resembles most *P. Michaeli* in habit, the short spike, numerous scale-like stem leaves and the absence of root leaves at the time of flowering.

TYPE: "On dry hills near the sea at Point Lobos, near San Francisco."

CALIFORNIA: San Francisco county, 1892 and 1893, *Michener & Bioletti.*

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hyperborea Lindl. = L. hyperborea.
—*a genuina* Kraenzlin = L. hyperborea, L. viridiflora, L. major, L. media.

PLATANTHERA Rich.
—*β convallariaefolia* Kraenzlin = L. convallariaefolia.
—*β major* Lange = L. major.
—*γ dilatata* Kraenzlin = L. dilatata, L. Huronensis, *Habenaria pedicellata* S. Wats., P. Cooperi, L. graminifolia, and L. borealis.
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—*β dolichorhiza* Lindl. = *Orchis dolichorhiza* = ?.
leucostachys Lindl. = L. leucostachys.
Schischmareffiana = P. Unalaschensis.
stricta Lindl. = L. stricta.
Unalaschensis Kraenzlin = P. Unalaschensis.

New Plants from Colorado

By George E. Osterhout

Linum Arkansanum

Seemingly a perennial, 1–1.5 dm. high, minutely scabrous pubescent or almost glabrous, branching from the base, the branches becoming almost as long as the stem; very leafy, from the base, the upper leaves often as long as the calyx lobes; stipular glands minute: leaves linear, 1–2 cm. long; the upper wider at the base and glandular toothed, developing a scarious midvein: flowers numerous, the peduncles about 5 mm. long, scarious wing-angled: the sepals glandular toothed, 3-nerved, the middle nerve scarious-winged, the larger sepals 1 cm. long, all aristate-pointed: the petals large, cuneate, 15 mm. long by 10 mm. wide at widest portion, orange-color, rose-tinted at the base: the styles united to the top, the capsule half the length of sepals, the septa thickened for about one-third of their extent.

A species somewhat related to *Linum rigidum* Pursh. Collected on gravelly prairie south of the Arkansas River near Rocky Ford, Otero county, Colorado, June 9, 1900, no. 2037.

Mentzelia aurea

Perennial, the stem whitish, rather stout, finely pubescent, glandular on the pedicels and ovary; corymbosely branched from near the base, the leaves linear to oblong, sinuate-dentate to sinuate-pinnatifid, the lower including the narrowly winged petiole, 10 to 15 cm. long, hispid on both sides: flowers numerous, vespertine, the earlier ones sessile, the others on pedicels 1–2 cm. long: petals 10, the five outer ones whitish on the outside, 2 cm. long and 8 mm. wide at the widest portion, narrowed to a claw which is nearly half the length of the whole petal; the five inner ones narrow and not more than half the size of the outer, a number of the outer filaments also petaloid: the capsule a little more than 2 cm. long, striate: the seeds round, winged, mature ones smooth, *i. e.*, not punctate.

Type specimens collected in Estes Park, Larimer county, Colorado, July 18, 1900, no. 2203. A showy plant, ranging from the edge of the foothills to an altitude of 7000 feet. Before the flowers open they appear to be white on account of the whitish outside of the petals, but when open they are golden yellow.

Artemisia silvicola

Perennial from creeping rootstocks, 4–6 dm. high, sparingly branched and loosely paniculate, the stems slender, finely pubescent, leafy to near the top with comparatively few leaves; the leaves linear, 4–6 cm. long, the wider 5–8 dm. wide, all entire or with few sharp teeth, acuminate and tapering to the sessile base, almost glabrate and green above, silvery canescent beneath with a close tomentum: inflorescence loosely paniculate, 2–3 dm. long, the heads scattered—*i. e.*, not dense—on the branches of the panicle, 5 mm. high and about the same in width, of about 10–12 marginal flowers and the same number of central ones, the corollas of the latter purple; the involucral bracts oblong, slightly tomentose.

Found along mountain streams at an elevation of 6000 to 8000 feet. The type specimens were collected along MacIntyre Creek, a branch of the Laramie river, in Larimer county, Colo., Aug. 24, 1900, no. 2242. A species belonging to *Euartemisia*. It is an ally of *Artemisia Mexicana* Willd. and distinguished by its fewer and larger leaves, the more lax inflorescence and larger heads.

Agoseris agrestis

A scapous perennial, glabrous and glaucous, especially the leaves; the stems usually single from the root, stout, erect, 2–4 dm. high: leaves numerous, from linear to oblong on the same plant narrowed to a petiole, and either entire, sparingly sinuate, dentate at the middle or some of the larger cleft at the middle, the divisions pointing upward, the larger 10–15 cm. long, acuminate: the involucral bracts finely pubescent, in three series successively longer, oblong, acuminate, about 2 cm. long: the flowers yellow (purple in drying): the ribbed achenes 12 mm. long, including the stout beak of nearly half this length; the pappus copious and very white.

A plant of the meadow lands of the mountains. The type specimens were collected in Estes Park, Larimer county, Colo., July 20, 1900, no. 2215. Collected also by Prof. Aven Nelson at Willow Creek, Albany county, Wyo., no. 3372. This species is readily distinguished from *Agoseris glauca* (Pursh) Greene by the wider leaves, the stout upright scape and the larger heads.

Dacryopsis Ellisiana Massee

By E. J. Durand

In a note with the above title in the Bulletin for September, Mr. George Massee calls attention to my error * in considering *Coryne Ellisii* Berk. to be the same as *Graphium giganteum* (Peck) Sacc. Mr. Massee's point is well taken, and I hasten to acknowledge my mistake, as well as to thank him for pointing it out. In July Mr. Massee wrote me regarding this point, and very kindly enclosed a fragment of the type of *Coryne Ellisii*. This specimen which I have just had opportunity to examine has convinced me that my conclusion was wrong.

Mr. Massee says that he cannot say why I made such a mistake. I will try to explain. I had access to two specimens which I supposed to be authentic. In the first place, the original specimens of *Coryne Ellisii* were collected and sent to Berkeley by Ellis. I assumed, therefore, that the specimens in the N. A. F. 1383 had been compared with duplicates of the type. In the second place, I have in my collection a specimen called *Graphium giganteum* from Professor Burt, which bears on the label the following note: "*Dacryopsis Ellisiana* (Berk.) Massee. A duplicate from the collection authenticated as *D. Ellisiana* by Massee." Both of these specimens are *Graphium giganteum* (Peck) Sacc., with no indications of basidia.

In the light of these specimens I think it only natural that both Professor Burt and myself should conclude that *Dacryopsis Ellisiana* (*Coryne Ellisii* Berk.) and *Graphium giganteum* (Peck) Sacc. were the same.

* Bull. Torr. Club, **28**: 349-355. Je. 1901.

Proceedings of the Club

TUESDAY, OCTOBER 8, 1901

This meeting was held at the Museum, Botanical Garden, Bronx Park, at 3:30 P. M.; Dr. L. M. Underwood in the chair; 27 persons present.

One active member was elected: Mr. W. L. Sherwood, 36 Washington Place, New York City.

The program consisted of informal reports on summer's work.

Dr. Underwood spoke of his collecting in Puerto Rico, examining thoroughly the western part of the island during five weeks spent there; details concerning which will be given later. He collected over 1000 numbers of dried plants and sent back a number of cacti now growing in the Botanical Garden. He afterward attended the A. A. A. S. meeting at Denver, Colorado, and spent some time in botanical work throughout many parts of that state, collecting about 600 numbers of the fall flora, particularly about Ouray.

The Secretary reported extension of range of *Aster curvescens* by his discovery of its growth in quantity in the southern Berkshire hills.

Dr. MacDougal reported that he had aided Prof. Elrod in maintaining a summer laboratory for four weeks at Big Fork at the north end of Flathead Lake, where he entertained Dr. H. C. Cowles and twenty students of the University of Chicago. Dr. MacDougal then joined a collecting party exploring a part of northern Montana not known to have been before visited by a botanist, except Canby, who gave it a flying trip in 1883 or 1884. Dr. MacDougal collected about 900 flowering plants.

Mrs E. G. Britton mentioned her collecting at the end of May last on Slide Mountain in the Catskills, discovering on Slide Mounnear the balsam limit, several interesting mosses not before attributed to the Catskills.

Dr. M. A. Howe reported on his eleven weeks of collecting, mainly of marine algae in Nova Scotia and Newfoundland. He made about ten principal stays of about a week each, at Yarmouth,

Digby, Grand Pré, at Pictou, a station for *Fucus serratus;* at North Sydney, Cape Breton; at Channel, near the southwestern end of Newfoundland, the richest locality in the larger kelps. There the coast, Newfoundland is almost treeless, as is generally reputed, though firewood and lumber are obtainable twenty miles inland, but the west coast farther north is forested with spruce, fir, and tamarack, with yellow and white birch. Journeying east through the practically uninhabited interior, a thin coniferous forest was met, especially all around the numerous lakes. Where fires had been through it, for 20 or 30 miles all was a flaming purple of fireweed (*Epilobium*).

Dr. Howe remained four weeks in Newfoundland, and was afterward at Halifax Harbor, N. S., where Harvey, author of the Nereis, had made many collections. Altogether, Dr. Howe, with his two companions, collected about 12,000 specimens, including duplicates, a third of this number being algae.

Mr. R. M. Harper reported collecting again in Georgia, with about 500 numbers, visiting many new localities, traveling about 1400 miles by rail, and doing much work on plant-distribution. He spoke particularly of the remarkable flora of the sand hills in Bulloch county, resembling the "scrub" flora in Florida. Among the interesting plants collected by Mr. Harper were *Elliottia*, and, at Thomasville, Ga., *Nymphaea orbiculata*.

Dr. Rydberg reported on his visit to Sweden and Norway, with interesting comparisons of the subalpine flora of Norwegian moraine and mountain slopes visited, the plants chiefly circumpolar and therefore common to North America.

Mr. William A. Murrill reported his attendance on the Botanical Congress at Geneva and that of the zoölogists at Berlin, with references to kind attentions given him at the Kew Gardens and the Linnaean Society rooms, London.

Mr. Lighthipe mentioned a new locality, at West Orange, for *Nasturtium sylvestre*, rare in New Jersey.

Mrs. Isaac P. Harris spoke of her work in the Adirondacks among the lichens, with one species new to her in that region.

Brief remarks followed regarding fall blossoming and foliation in New York City. It was noted that the maples, lindens, and buttonwoods in Union Square, Washington Square and Madison

Square are now covered with fresh leaves as in May, owing to defoliation by caterpillars. Horsechestnuts have new shoots and some have new blossoms. Cherry trees have also been in flower again. Mrs. Britton mentioned the magnolia and tulip trees of Bronx Park which have blossomed and fruited twice this year.

EDWARD S. BURGESS,
Secretary.

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